Strategic and Operational Plan
For Health Information Exchange for the Territory of Guam
(Civilian Population Only)

September 27, 2010

Change History

Version	Date	Items Changed
1.0	04/20/2011	Approved by the Office of the National Coordinator (ONC)

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1.0 Introduction

1.1 History

On February 13, 2009, Congress passed the American Recovery and Reinvestment Act (ARRA) and President Obama signed it into law four days later. ARRA is composed of twenty-eight different agencies that have been designated a total of $787 billion dollars in Recovery Funds. Each agency is to develop specific plans for how they will expend their funds. Once these plans are approved, the agencies award grants and contracts to state governments, schools, hospitals, contractors, and other organizations.

ARRA has five immediate goals:

- Create new jobs and save existing jobs
- Promote economic recovery
- Assist the people most impacted by the recession
- Provide investments needed to increase economic efficiency by urging technological advances in science and health
- Invest in transportation, environmental protection, and other infrastructure that will provide long-term economic benefits

While many of the ARRA projects are focused more immediately on jumpstarting the economy, others, especially those involving healthcare, are expected to contribute to economic growth for many years. A portion of the ARRA funds are being allocated to computerize health records to reduce medical errors and save on health care costs.

1.2 HITECH

The Health Information Technology for Economic and Clinical Health (HITECH) Act is the portion of ARRA specifically created in order to facilitate and support the adoption of healthcare information technology in order to improve overall health and medical outcomes. It outlines provisions specifically focused on healthcare information technology, including the promotion and testing of health information technology, grants and loans, and privacy. The HITECH Act is provides funds to states to support their efforts to achieve widespread and sustainable health information exchange (HIE) within and among states through the Meaningful Use of certified electronic health record (EHR) software. These funds were awarded through the State Health Information Exchange Grant Programs to states and qualified State Designated Entities (SDEs) to develop and advance mechanisms for information sharing across the health care system. The HITECH Act also outlines Medicare and Medicaid health information technology and miscellaneous Medicare provisions including:

- Medicare incentives to eligible providers
- Medicaid incentives to eligible providers
- Other Medicare provisions, including moratoria on certain Medicare regulations
- Long-term care technical corrections

The HITECH Act envisions health information technology working in coordination with the Medicaid and Medicare incentive programs. Providers, who must achieve Meaningful Use as defined in the HITECH Act, will be able to use the services of the Health Information Exchange

(HIE) to report on their compliance to federal requirements. Qualification for incentive payments that require the exchange of information with disparate providers can also be facilitated by the HIE.

The Medicare and Medicaid EHR incentive programs will provide incentive payments to eligible professionals and eligible hospitals as they adopt, implement, upgrade or demonstrate Meaningful Use of certified EHR technology. These payments are administered either through the Centers for Medicare and Medicaid Services (CMS) in the case of the Medicare program, or through the states for the eligible providers who qualify under the Medicaid program. The HITECH Act provided that CMS and the ONC develop the appropriate policies and definitions to enable the administration and distribution of the incentive funding. Through this enabling, CMS and ONC developed 42 CFR 412, 413, 422, and 495 that specify the criteria that must be met and processes that provide incentive payments to eligible professionals (EPs), eligible hospitals, and critical access hospitals (CAHs) participating in the Medicare and Medicaid programs.

This final rule specified the initial criteria EPs, eligible hospitals, and CAHs must meet in order to qualify for an incentive payment; calculation of the incentive payment amounts; payment adjustments under Medicare for covered professional services and inpatient hospital services provided by EPs, eligible hospitals and CAHs failing to demonstrate Meaningful Use of certified EHR technology; and other program participation requirements. Also, the ONC issued a closely related final rule that specifies the Secretary of Health and Human Services' adoption of an initial set of standards, implementation, specifications, and certification criteria for electronic health records.

1.3 Meaningful Use

Through ONC and CMS the Department of HHS has recently released the Meaningful Use final rule specifying the related initial set of standards, implementation specifications, and certification criteria for EHR technology with final Meaningful Use Stage 1 objectives and measures. It also recognized the technical infrastructure reflecting Meaningful Use objectives and adopted standards, implementation specifications, and certification criteria in the design of an HIE architecture. Appendix A of this document contains a table summarizing the final rule for Meaningful Use Certification Criteria for Health Information Technology released by CMS and ONC. The last column of the table, "HIE Stage 1" indicates a set of standards/implementation specifications recommended for content exchange, vocabulary, and security/privacy to be adopted for the first stage (Stage 1) of the Health Information Exchange (HIE) implementation as well as a set of capabilities to be offered at the Stage 1 of the HIE implementations. The following list identifies a minimum set of services to be offered for the Stage 1 requirements aligned with general and ambulatory/inpatient specific capabilities as specified in the Meaningful Use final rule:

- Electronic Prescribing Service (ePrescriping) - electronic generation and transmission of prescriptions and prescription-related information
- Laboratory Results Exchange Service - electronic submission of laboratory test orders and receiving/displaying of laboratory test results

- Exchange of Patient Summary Record - in the format of HL7 CDA Release 2, Continuity of Care Document (CCD)[1] with following minimum data elements:
- Demographics
- Problem list
- Medication & Medication Allergy List
- Laboratory test results
- Procedures
- Payers
- Admission diagnoses
- Discharge diagnoses
- Immunizations
- Review of systems
- History

Creating a patient-focused health care model enables the transformation to higher quality outcomes; more cost efficient patient-focused health care through electronic health information access and use by care providers and patients. The stated objectives are to open the door for electronic exchange of information, while protecting the privacy and security of patients' health information. This transformation will also allow the movement of electronic health information where it is needed, when it is needed, to support individual health care needs. In addition to these two objectives, the patient-focused health care model is built to establish systems for multiple stakeholder priority setting and decision making and to enable nationwide distribution of electronic health records and personal health records specifically to provide higher quality care. The objectives are as follows:

- To advance privacy and security policies, rules, procedures, and protections for health information
- To open the door to the movement of health information to support population-oriented uses
- To encourage nationwide adoption of technologies that will improve population and individual health
- To create processes supporting healthcare information for use in improving population health

[1] HITSP/C32 "Summary Documents Using HL7 CCD Component" as an implementation specification to be adopted

2.0 Project Background

2.1 Guam

The territory of Guam is home to a significant military population. THIS STRATEGIC AND OPERATIONAL PLAN FOR HEALTH INFORMATION EXCHANGE FOR THE TERRITORY OF GUAM IS SPECFICALLY DESIGNED TO PROVIDE FOR THE CIVILIAN POPULATION ONLY. Guam, like the rest of the nation, faces challenges in addressing increasing health care costs, improving access to medical care, and ensuring and improving quality healthcare for patients. Timely access to essential medical information by providers at the point of care is critical to optimized patient outcomes. As a result of its unique situation, Guam will be benefited significantly by Health Information Technology (HIT). Guam is the only US possession (as distinguished from a US commonwealth) in the world, and the only territory in the western Pacific, located approximately 3,300 miles west or a seven and a half hour flight from the closest US facility in Hawaii. Because of the limited medical facilities on island, many patients seek treatment for more sophisticated procedures in Hawaii, the US mainland or other medical facilities within the Pacific Region including Japan, the Philippines and China. Receiving treatment outside of Guam frequently creates a problem when the patient returns to the care of his or her local clinician. The inability to exchange healthcare information electronically often means the local Guam clinician does not have access to the complete medical record for the patient.

Since Guam is 15 hours ahead of the Eastern Standard Time, the time difference frequently makes it very difficult to contact providers in the US to request and receive records. The problem is also present with medical services on Guam itself. There is no central electronic health record database in Guam. The sole civilian hospital often experiences delays in providing patient summaries and updating medical records with results. There is also a US Naval hospital and Veterans facility that cares for many patients who are also seen in the civilian medical pool. Many of the procedures and tests done in these facilities suffer as much as those within the civilian hospital in delayed transcription and posting after visits. In addition, many of the tests ordered in these facilities are sent to other naval facilities in Hawaii or the mainland and take an inordinate time for the results to return.

Within the next four years, Guam is expected to realize an increase in population by 20% (approximately 35,000) as a result of the US Department of Defense's (DoD) plans to relocate more than 8,000 Marines and their estimated 9,000 dependents as well as other supporting personnel from Japan to Guam. Beyond this direct redeployment which is expected to begin around 2014, this US military realignment will require additional workers to move to the island, including non-defense personnel, DoD contractors, transient military personnel and temporary foreign construction workers which will begin to impact the island in 2011. As such, this U.S. overall military realignment and buildup will substantially impact Guam's community and infrastructure.

The Guam eHealth Collaborative (GeHC) projects that in excess of $1.8 million in capital will be needed to implement the strategic and operational plan for the proposed territory health information exchange. This funding is needed to develop the territory plan, the creation of a robust infrastructure, and the initial start up of the operational plan in order to support the

existing community and to begin to deal with the impact of the military buildup. This rapid and significant, $15,000,000,000+ military buildup introduces a level of uncertainty as to the scope that the territory HIE will have to encompass to meet the health information needs of the entire community, including the expanded population. While the GeHC is chartered to address the needs of the civilian population only, the influx of personnel will still create an unprecedented challenge for the territory. In addition, the healthcare providers of Guam also frequently provide care to residents of the Federated States of Micronesia, the Northern Marianas, the Republic of Palau and the Republic of the Marshall Islands. At the very minimum the need to accommodate this significant population shift means that the scope of the HIE project is much larger than the current population of Guam would otherwise indicate.

2.2 Guam Governance Authority

The Territorial Governor signed Executive Order No. 2009-12 in 2009 establishing the Guam eHealth Collaborative (GeHC). The Governor appointed representatives from various stakeholder groups through this Executive Order to provide expertise and input into the development of the Strategic and Operational Plan. The Executive Order is shown below and outlines the basic duties of the governing body and details the representative organizations for membership.

Executive Order No. 2009-12

- The GeHC shall provide guidance and coordination of electronic health information exchange (eHIE) and related efforts and promote engagement of health care providers, health care systems, and consumers among others,
- The GeHC shall develop a plan to implement eHIE considering ways to advance the adoption of electronic information technology, identifying opportunities for partnerships, and incorporating national standard setting organization recommendations for secure eHIE;
- The GeHC shall promote the public good by ensuring an equitable and ethical approach to eHIE for the improvement of health care;
- The GeHC shall encourage collaboration and facilitate a standardized approach to interoperable eHIE in Guam and the region;
- The GeHC shall recommend policy that will advance eHIE in Guam while protecting the privacy and security of citizens private health information;
- The GeHC shall leverage existing eHIE initiatives in Guam and proactively seek opportunities to utilize HIE for the betterment of Guam's health care system;
- The GeHC shall consist of no more than 15 members appointed by the Governor. The GeHC shall be composed of the Agency Head or a representative from:
    - Department of Public Health and Social Services
    - Guam Memorial Hospital Authority
    - Department of Mental Health and Substance Abuse
    - Bureau of Information Technology
    - Guam Retirement Fund
    - Guam Medical Association/Society
    - Guam Nursing Association
    - Guam Pharmacists Association

    - Guam Legislature
    - Department of Administration
    - Bureau of Budget and Management Research
    - Health Insurance Company
    - Chamber of Commerce
    - Representative(s) identified by Collaborative
- The GeHC shall meet regularly as determined by the GeHC and provide updates to the Lieutenant Governor, including an annual written report on plans, activities, accomplishment s and recommendations for eHIE in Guam;
- The GeHC shall promote education and engagement among stakeholders to facilitate the successful implementation of eHIE;
- The GeHC shall further public and private partnerships for the development of an island – wide eHIE infrastructure; and
- The GeHC shall encourage eHIE initiatives at the local, regional, and national level.

2.3 Guam Facts

Guam is located approximately 3,300 miles West of Hawaii, 1,500 miles east of the Philippines and 1,550 miles south of Japan. The island is the Western-most territory of the United States and is one of the leading tourist destinations in the Western Pacific. The total population of Guam in 2008 was 192,805 persons, as released by the U.S. Bureau of the Census in June 2008.

Guam offers some significant health care advantages to Americans living in Asia. Guam's health care system includes two major hospitals (one civilian and one military), a widespread clinic network, a broad selection of general and specializing physicians, and medical evacuation operations to Hawaii, the U.S. mainland and the Philippines. The island's two hospital facilities are the Naval Regional Medical Center and Guam Memorial Hospital. While the Naval hospital provides services to veterans, active-duty personnel and military dependents, Guam Memorial Hospital provides the only hospital care for the remainder of the general public. The Guam Memorial Hospital is the only publicly owned facility operated as part of the government of Guam.

Guam has ten specialty and emergency care clinics and about 30 pharmacies for prescription drug needs. Specialized healthcare facilities include Guam Radiology Consultants, 2 renal care facilities, Guam's first privately owned and operated birthing center with all the comforts of home, a surgical center for outpatient surgical procedures, and the Heart & Vascular Institute of Guam.

The medical board of physicians on Guam has set standards for practitioners which are similar to those in California. All doctors must be U.S. trained and board eligible to practice on Guam.

There are 87 most highly consumer-rated clinicians in Guam:

- 4 professional staff from the Guam Department of Public Health and Social Services
- 16 Public Health Nurses from DPHSS
- 12 family practice clinicians
- 16 physicians from the Guam Medical Society
- 31 labor and delivery clinical staff from Guam Memorial Hospital

- 6 staff from Sagua Managua birthing center
- 2 pediatricians from the Naval Hospital

The organization of healthcare is similar to that of the mainland US in terms of medical licensure requirements, types of healthcare providers, and a public-private healthcare system, which focuses on acute care rather than preventive services. Several public and private insurance companies serve the population of Guam. Public health insurance includes federal Medicare and Medicaid programs, as well as a locally funded insurance program called Medically Indigent Program (MIP).

- Medicare enrolls about 2,000 Guam Seniors.
- Medicaid enrolls about 8,000 people.

There is an overall lack of government funding and resources, particularly with respect to medical specialists. Most patients who require the immediate attention of specialists must go off island to Hawaii.

All public health services depend on having a basic infrastructure, especially in terms of personnel. Unfortunately, Guam is experiencing health workforce shortages due to the early retirement of its most experienced professionals. Human resources for health are still lacking in critical areas and must be developed locally to the greatest extent possible.

The Division of Environmental Health of the Department of Public Health and Social Services (DPHSS) is also understaffed. Over half the Division's staff has fewer than five years experience, and staff generally lacks specialized training.

All health care products, from toothbrushes to prescription medications, are regulated and monitored by the Drug and Medical Device Program. Because of Guam's geographical location and the ethnic diversity of its people, various drugs and medical devices of foreign origin are imported, distributed and marketed. These include many poorly labeled, misbranded and adulterated drugs, as well as hazardous medical devices. Training in the area of drug and medical devices is therefore necessary for staff of the Division of Environmental Health. Forged prescriptions, lack of accountability of controlled substances by businesses, and illegal dispensing of controlled substances are estimated to be significant problems. However, because of the lack of human resources, only the most significant cases are pursued and investigated.

Guam is faced with the challenge of maintaining a health care system that will adequately meet the needs of a predominantly young and growing population. At the same time, it is also facing the added challenge of addressing the problems of the rapidly increasing number of older people, forecast to increase from 3.9% of the total population in 1990 to 7.5% in 2010.

A reduction in human and financial resources has severely impacted the health system. An early retirement program instituted at the end of 1999, led many experienced health workers to retire. While the vacated positions have continued to be funded, there is not a large enough resource pool to fill all of them. Tightening government budgets have left some less critical positions vacant, and these vacancies have reduced the overall amount of services available to the

uninsured and underinsured population. The vacancies have also affected progress in strengthening other health service priority areas, such as disposal of hazardous and toxic materials, environmental protection, vector control, and drug and alcohol abuse services.

2.4 Vision

A strong vision statement is the key to a successful Strategic Plan. It sets the direction for the organization and inspires others to want to help your organization achieve a desired future state. A vision statement provides inspiration and becomes the foundation on which the organizations business strategy is built. A strong vision statement has five key attributes:

- Clear – easy to understand
- Compelling – enlists others in helping you
- Challenging – difficult but achievable
- Consistent – transcends time and can serve as a guidepost for many years
- Charter – defines the purpose for being in existence

The vision statement will describe the desired future state to which an organization aspires. While organizations rarely attain their ultimate vision, it remains something that everyone associated with the organization can understand and hope to achieve. It serves as guide and is used to enlist stakeholders in the journey to the desired future state.

The Guam eHealth Collaboration assembled in August 2010 to create a vision for health care information exchange in Guam. They discussed their aspirations for health information exchange and created the following vision statement:

Ensuring healthcare information can be exchanged safely and securely, to improve the quality of healthcare across Guam to benefit its residents and others seeking care there.

2.5 Mission

A mission statement defines the fundamental purpose of the organization and describes what the organization does to achieve its vision. It outlines the basic purpose and process for getting the organization to the desired level of performance that is described in the vision statement. The mission statement has five key attributes:

- Connects with the vision – describes the path the organization will take to reach its vision
- Sets the purpose – defines the fundamental purpose of the organization
- Establishes the framework – sets the parameters for work activities
- Describes the primary services – describes the basic services offered by the organization
- Defines the customer – tells who the services are designed to benefit

The GeHC assembled in August 2010 to establish the mission for healthcare information exchange in Guam. They discussed their aspirations for health information exchange and created the following mission statement:

To become the trusted exchange of health information to improve the quality, safety, and efficiency of healthcare for the residents of Guam and those seeking healthcare there.

2.6 Principles

Principles describe the foundational beliefs that are shared among the stakeholders of an organization. They represent a set of values that establish an obligation for the organization to behave or act in a certain way. Principles are voluntary and without external coercion and describe the organization's desired culture and priorities.

The Guam eHealth Collaborative has developed the following principles for health information exchange:

1. Operate with Transparency and Openness: All Health Information Exchange (HIE) Governance activities should meet the highest standards of an open and transparent organization that strives to keep consumers and stakeholder informed.
2. Build Stakeholder Trust: Create and foster trust by and between healthcare stakeholders to further the willingness to exchange healthcare information and data.
3. Maintain Neutrality: Ensure the statewide HIE remains neutral in the competitive marketplace in Guam and delivers a high quality exchange service that meets the needs of all stakeholders without giving an advantage to any particular stakeholder(s).
4. Stakeholder Investment: All stakeholders should contribute financially to the formation and ongoing operation of the statewide HIE.
5. Offer Personal Choice: The patient is at the center of the healthcare universe and as such is entitled to have their electronic health records available to assist in the continuity of care.
6. Foster a Culture of Innovation: The HIE should take advantage of the creative nature of the market in Guam and develop an organizational culture that taps into and benefits from the innovative ideas of its citizens.
7. Engage Stakeholders: Efforts must create value for all participants-statewide, regionally, and for each stakeholder interest. To promote acceptance and adoption, it is important to communicate with and educate all participants early and often regarding the value and benefits of HIE.
8. Promote Statewide HIE solutions: Every region of Guam is different and should be given the flexibility and option to fit into the emerging HIE infrastructure in the way that is appropriate to service patients and protect patient health data.
9. Leverage Existing HIT Initiatives and Resources: A coordinated effort, leveraging existing initiatives and resources, provides the greatest potential for improving HIT adoption rates and HIE success.
10. Be inclusive: Sensitivity to the culturally diverse population should be considered as part of the design, development, and implementation of all HIE activities.
11. Focus on the Primary Purpose: HIT / HIE is only one tool used to accomplish the broader goal of improved healthcare outcomes for all citizens of Guam.
12. Build a Leaning Health system: As defined by the Office of the National Coordinator (ONC), a Learning Health system is designed to generate and apply the best evidence for the collaborative care choices of each patient and provider; to drive the process of new discovery as a natural outgrowth of patient care; and to ensure innovation, quality, safety, and value in healthcare.

13. Foster fair processes: When an issue is complex and various stakeholders may be at odds, create a fair and logical process to research and analyze the issue and determine the outcome.

2.7 Governmental Structure

The department of Public Health and Social Services is responsible for the Health Information Exchange, Medicaid and Public Health. The Director reports directly to the Governor and coordinates the work of the Divisions shown in the organizational chart on the following page:

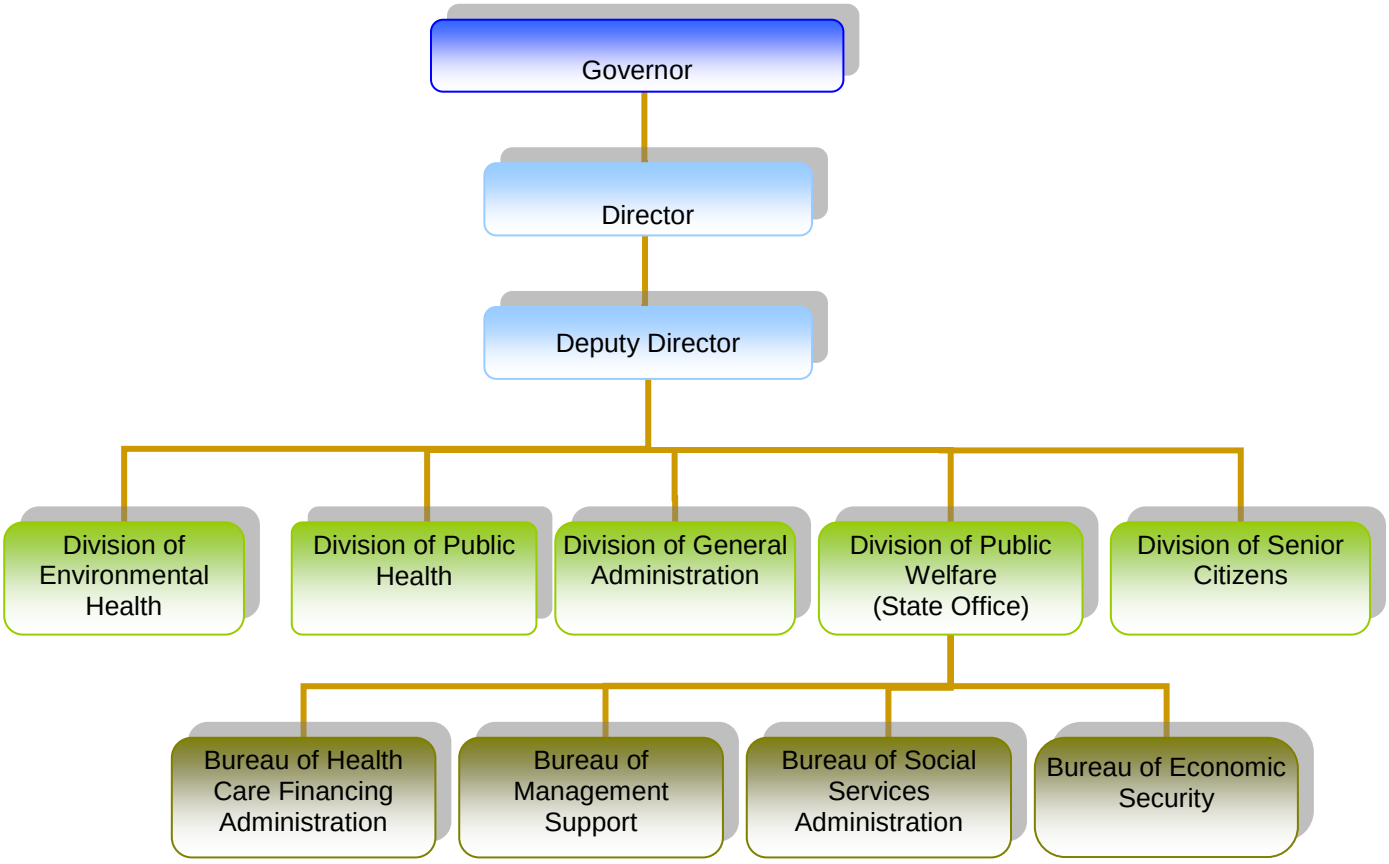


Figure 1 Governmental Structure

3.0 Environmental Scan

3.1 Environmental Scan Process

The Territory of Guam, Office of the Governor was awarded a grant from the Office of the National Coordinator in March 2010 to write a Strategic and Operational Plan for Health Information Exchange (HIE) in Guam. Hielix and MEDNET teamed together to respond to a competitive RFP process and were selected to assist the territory with this important work. In order to prepare for writing the required plans, Hielix and MEDNET conducted an Environmental Scan across the Territory from September 7 to September 10, 2010.

The purpose of the Environmental Scan is to present an analysis of the information gathered and detailed in prior reports, as well as to provide an evaluation of the structured interviews conducted during September 2010.

3.1.1 Review of Existing Documents

The Environmental Scan consists of three major components: 1) Review of existing documents from previous HIE work; 2) Interviews with potential stakeholders; and 3) Discussions with various state agencies.

Prior to beginning the Environmental Scan, the Territory collected and analyzed over several documents and reports from previous work. The primary documents and reports reviewed included:

- Guam's Collaborative Grant Application
- Department of Public Health and services Request for proposals
- Background report on the Guam eHealth Collaborative
- Diagnostic Laboratory Services Guam Lab Assessment Report

In addition additional documents and reports were discovered during the Environmental Scan and copies were made available for review and analysis.

3.1.2 Interviews with Potential HIE Stakeholders

Onsite interviews were conducted for the environmental scan throughout the Territory during the month of September 2010. During the environmental scan process, the Territory met face-to-face with 24 different health care provider entities and interviewed 77 healthcare professionals.

The Territory interviewed the following representative organizations during the Environmental Scan:

- Urban Hospital
- Critical Assess Hospital
- Federally Qualified Health Centers
- Payers
- Various Clinics and Physicians
- Public Health Unit
- Long-term Care Facilities
- Medical Associations
- Chamber of Commerce

- State Agencies
- Consumers

3.1.3 Discussion with Territory Agencies

In addition to the provider organizations, the Territory met with representatives from various Territory agencies including:

- Department of Public Health and Social Services
- Department of Medicaid
- Governor's Office

In many ways, the internal departments of the Territory of Guam are a microcosm reflecting the status of the Territory as a whole. Some effort is currently underway to identify all the disparate systems within the various departments and then address their own state of readiness for interconnectivity. At the time of this plan, the list was not yet complete.

The Guam Department of Medicaid (DOM) is currently engaging in its own planning process. They are preparing a competitive bid process to select a vendor to assist them with the development of the Territory Medicaid HIT Plan (SMHP). It is expected to be awarded by November and will coordinate with the Territory's HIE Strategic and Operational Plan.

3.1.4 Data Analysis

After the stakeholder interviews were completed, the Territory carefully reviewed and analyzed all of the relevant data and information. The result of that analysis is shown in the following Sections.

3.2 Value Proposition

The value proposition is the statement that describes why an organization would willingly participate in a venture such as a Health Information Exchange. The value proposition is a clearly defined statement designed to demonstrate a proposed service offering that will solve a problem in such a way that the value to the participating organization is greater than the value of not participating.

An optimal value proposition will provide reasons a potential healthcare stakeholder would want to be included in the HIE Project. In order to achieve the project objectives, the value propositions need to be clear, concise, and compelling. By identifying stakeholder needs through the Environmental Scan research and analysis, it is possible to develop clear and concise value propositions for each stakeholder that reflect specific stakeholder requirements. When the stakeholders' return on investment (ROI) is measured over time, the tangible results participants can reasonably expect from participating in the HIE can be quantified and reported[2].

[2] Adapted from Wikipedia

The value proposition is important because it is a key component of any financial sustainability model. Linking an organization's value proposition to an achievable ROI is key to keeping the organization engaged throughout the creation and implementation of the HIE. Developing an ROI for each participant and continually reporting on it during the HIE formation process will serve as a reminder of the value the HIE will provide to each stakeholder when fully functional. As a product of the Environmental Scan, the following table shows the prime value proposition(s) for each stakeholder category.

Table 1 – Value Propositions

Stakeholder Category	Value Proposition
All Participating Entities	▪ Improved quality of care ▪ Cost savings
Primary Hospital	▪ Higher quality of care ▪ Continuity of care ▪ Greater operational efficiencies
Critical Access Hospitals (CAH)	▪ Continuity of care ▪ Better connectivity to the primary hospital ▪ Long-term financial viability
Federally Qualified Health Centers (FQHC)	▪ Ability to meet reporting requirements ▪ Better connectivity to the primary hospital
Clinics	▪ Better connectivity to primary hospital ▪ Continuity of care
Public Health	▪ Easier data entry in the registries ▪ Ability to fulfill mission and survivability
State Association	▪ Ability to provide assistance to their members during the transition to EHR technology ▪ Member education
Long-term Care	▪ Continuity of care ▪ Better connectivity to other healthcare providers
State Agencies	▪ Better integration between departments

3.3 Health Information Technology Adoption

There are approximately 193,000 people residing in Guam. As of 2010, there were 296 practicing physicians in Guam. Healthcare facilities include:

- 1 Acute Care Facility
- 7 Critical Access Hospitals (CAH)
- 3 Psychiatric

- 1 Rehabilitation
- 1 OB/GYN
- 9 Long-term Acute Care Facilities

3.4 Health Information Exchange Readiness

Electronic health information exchange usually starts with a recognized value proposition between providers. For example, physicians refer patients to the local laboratory for tests and need the results back for proper treatment. The patient may need hospitalization for treatment and the physician will admit the patient to the local hospital. Having current and complete patient information is important to successful treatment. Therefore, an organic need emerges for the exchange of patient information for proper treatment. This need becomes the value proposition for exchanging health related information between physician, the lab, and the hospital.

Extended further, this example is the foundation for a healthcare ecosystem. The patient may need additional treatment and be referred to a tertiary hospital for care. Other physicians in the community provide treatment in the same manner and they also recognize the need to exchange healthcare information electronically. As this need is recognized, more providers become participants in the ecosystem. Labs, pharmacies, hospitals, long-term care facilities, public health agencies, clinics, hospice, state agencies, and others have a need to electronically exchange information and see value in doing so. When establishing these connections on a required transaction by transaction basis, the exchange begins to create its own network and grows over time.

In Guam, a single organic ecosystem has emerged over time centering around the primary hospital. Typically, healthcare providers see the need to make electronic connections within their geographic region.

Local clinics and providers recognize the need for electronic exchange but often lack the resources to make it happen. Many are already aligning with the larger private prospective payer system (PPS) hospitals and in one case, a Critical Access Hospital (CAH) has signed a merger agreement with a major PPS hospital. This is likely to become a trend as the financial burdens of EMR technology and the need to share data electronically increase.

Based on the review of the current HIE best practices, healthcare information exchange in Guam needs to begin within the natural, regional organic ecosystems. This is where the greatest need exists, where the value proposition is strongest, and where the greatest population base can be served. Connecting these ecosystems will provide the biggest and most immediate return on the investment in HIE technology. Therefore, the design of the technical infrastructure will approach connecting these organic ecosystems as the overall design is completed.

3.5 HIE Readiness

During the Environmental Scan process, the interview team learned that the majority of facilities in Guam are without EHR technology. The primary reasons cited for not implementing an EHR are as follows:

- Upfront cost involved
- Difficulty of finding multiple vendors serving Guam in order to provide a choice for the provider

The primary hospital serving Guam currently has the Keene Health Care Solution. They are also looking to upgrade some modules to Cerner Millennium. The largest clinic in Guam is using McKesson Practice Partner but is moving to the Sage EHR product. Other EHR applications in use include NextGen, eClinical Works and VistA. Generally, most providers do not have electronic health records technology.

3.6 Connections to Asia

Guam receives much of its medical care from Asia, particularly from the Philippines. There are three hospitals in the Philippines that serve a large portion of the Guam population. In fact, the payers in Guam refer patients to the Philippines instead of Hawaii or California because it is much less costly to get the care needed in Asia. In addition, Guam has a large tourist trade form Asia including Japan, South Korea, Singapore, and the Philippines. Given all of these connections and the fact that Guam is the US gateway to Asia, consideration of connecting to these countries is an important consideration.

3.7 Summary

The main source of data for the environmental scan were in-person interviews which provides a representative sample of data from which to establish the current state of HIT adoption as well as intention toward participation in an HIE. The following conclusions can be drawn from the data:

- The success of participation in exchanges relies on the availability of EHR technology in Guam.
- Whether or not they have or are implementing an EMR, all providers seem to recognize the inevitability of an EHR as well as an exchange of clinical data.
- Guam is a poor Territory and the government does not have the resources to provide assistance to providers to adopt EHR technology.

3.8 Issues

3.8.1 Adoption

Rates of adoption of EHR technology vary widely across the territory and in most places, there is very limited adoption. However, even in the more advanced hospital system, adoption can vary significantly among facilities and individual providers. It has been determined in other studies across the US that only 50% to 60% of providers are using EHR technology to “some extent” and in Guam it appears to be less than 25%. One strategy emerging from the Strategic and Operational Plan will be the emphasis toward improvement in the adoption and use of EMR technology if HIE is to provide the value it promises.

3.8.2 Workflow Impact

Perhaps the biggest issue facing the successful exchange of health information is that it forces people to adopt new ways of doing their jobs. Routine repetition of work related tasks has a calming effect on workers. Workers like to know what is expected of them and they take pleasure in knowing how to do their jobs satisfactorily. Whenever change is introduced into the workplace, it disrupts the normal flow of work and may cause people to resist. Even when workers understand the rationale for the change and may even agree with it logically, they will remain emotionally skeptical. Frequently, workers are not shown how the change impacts them directly. Many concerns typically arise. *Will I be able to perform the new work tasks as well as I could the old tasks? If I don't perform as well, will that impact my employment? Will I still have the same power and prestige in the organization? Will the change eliminate my job? Will I still be working with the same people whom I know and trust? Does my superior know how the change will impact us and what does that mean for me?* All of the issues articulated above slow the adoption of EMR technology.

One way to deal with this issue is to leverage the lessons of change from other industry sectors. The most successful change models seek a balance between the technology and required changes in operational processes. Believing HIE and EMR are simply about technology is one of the fastest ways to ensure failure of any HIE effort. Operational processes (Governance, Privacy and Security, Business and Financial Planning) are equally important elements in building a sustainable HIE. It is tempting to seek the technology solution that will substitute for the hard work necessary to establish sound operational processes. Despite what the vendors will tell you, there is no technology for working through these processes. The successful approach doesn't neglect technology - the HIE leadership team must keep a good balance between the allure of technology and the challenges of building a solid operational foundation.

3.8.3 Broadband

In most of the interviews, broadband connections were not cited as an issue. Guam seems to have reasonable Broadband coverage on the island. Guam has fiber rings around the island and island wide wireless coverage. There is good overlap and near ubiquitous coverage on the island. However, additional research is needed to better understand the broadband situation in the more rural areas of the island.

3.8.4 Time

Exchanging health information is a process that can take time to establish. From the point in time that a state or territory decides HIE is of value and wishes to exchange information across the state, it can easily take up to three years before any meaningful quantity and quality of data can be exchanged. Identifying the best information to exchange, getting stakeholders to commit to exchanging information, and building an operational exchange takes time and patience. Of course, during this lengthy process stakeholders can lose interest or get distracted by needs that are more urgent.

3.8.5 Medicaid

Medicaid in Guam is clearly behind in its use of and conversion to health information technology. The Medicaid reimbursement system is completely manual and paper based and plans to upgrade it depend on getting the I-APD completed and funded. In addition, its history of slow

payments has forced many of the providers in Guam to stop taking Medicaid patients. For example, only 6 out of 30 pharmacies in Guam will accept Medicaid. Many of the physicians interviewed during the Environmental Scan did not accept Medicaid and cited slow pay as the primary reason. It is unclear how Medicaid will administer the HITECH incentive program and that lack of clarity could result in a number of potentially qualified providers receiving the lower payments under the Medicare program and pediatrician providers receiving no incentives.

3.8.6 Public Health

While a critical entity in healthcare across the Territory, Public Health is significantly underfunded and will have a difficult time converting to EHR technology. Given the amount of healthcare data Public Health collects and reports, finding a way to ensure it is included in the HIE will be important to the overall success of the HIE

3.9 Environmental Scan Participants Feedback on HIE

During the Environmental Scan potential stakeholders were asked a set of questions. One of those questions concerned the benefits to them of HIE. The responses fell into two categories. First, they spoke about the fundamental qualities necessary for HIE to be beneficial. These qualities included:

- Ease of Use - Many providers talked about the importance of ensuring the HIE is easy to use (single sign on screen, one password, instant information, etc.).
- Benefits to Workflow - Providers want to see the HIE add value to their clinical workflow – make my life easier (necessary information first, doesn't waste time in front of the patient, etc.).
- Exchange Capability - Many stakeholders indicated that they need to exchange information with other countries in Asia, as well as with California and Hawaii. The HIE needs to help facilitate this process.
- Clarity Concerning Privacy and Security - There appears some misunderstanding and inconsistent understanding concerning the application of HIPAA. Providers need to understand HIPAA better and how it applies in Guam.

Second, potential stakeholders spoke about healthcare in general and HIE benefits offered to them and their organizations. These benefits included:

- Easy access to a more complete and accurate record
- Higher quality of care with improved medical outcomes
- Decrease in inappropriate and/or unnecessary admissions
- Reduced treatment errors
- Decreased lengths of hospital stays
- Better medication reconciliation
- Decreased time to see patients
- Better continuity of care
- Lower costs, increased staff efficiencies
- Better response to emergency situations
- More time spent on patient care and less on administration
- Decrease in claims denials
- Better quality outcomes

- Easier reporting to the state and feds
- Reduction in chronic disease states
- Reduced wait times for patients
- Better communications
- More patient access to information and control of their health information
- Easier to transmit state required information
- Improved patient safety

The Environmental Scan also identified several areas of concerns about the use of EMR technology and HIE. These concerns included:

- Initial start-up costs
- Long-term sustainability
- Agreed upon standards and protocols
- Ease of use
- Proof of value
- HIPAA security and breach of confidentiality concerns generally, and more specifically, who has access to what information
- Integration of and interoperability of disparate HIT systems
- Functionality
- Liability for breaches of information
- Loss of control over data
- Integrity of the information
- Broadband capabilities and capacity
- Uniform policies and procedures
- Useful implementation from the beginning
- Time needed to train staff
- Staff resistance to electronic records
- Workforce training
- Who operates it

3.10 e-Prescribing Readiness

There are 30 pharmacies in Guam. It is reported that 100% of pharmacies in Guam have the capability for e-Prescribing. At the present time, only one pharmacy is actively e-Prescribing. The other pharmacies are capable but the provider community lacks the technology to actively e-prescribe. Approximately half of the pharmacies are using the Erteby pharmacy application for e-Prescribing. The only pharmacy reported to lack e-Prescribing capability is the public health pharmacy.

3.11 Structured Lab Results Readiness

Guam has seven (7) clinical labs serving the island. They include the Guam Memorial Hospital, Diagnostic Laboratory Services (DLS), Seventh Day Adventist Clinical Laboratory, and Labtech Diagnostics. Two of the other labs are operated by community health centers and one by Public Health. 70% of the outpatient lab work is done by DLS and DLS serves as the reference lab for the Department of Public Health and other labs.

Given DLS is the reference lab for most providers in Guam, they are the main focus for transmitting structured lab results. The status of electronically reporting structured lab results with the major healthcare providers in Guam is as follows:

- Guam Memorial Hospital – DLS is currently in the planning stage of developing an electronic result interface with the hospital's Cerner system. Lab reports are accessed directly by physicians via DLS web site-(www.dlslab.com).
- Seventh Day Adventist Clinic (SDA) – DLS actively transmits lab results to the clinic which uses the Shuylab Laboratory Information System and the Practice Partner EMR system. SDA also has a DLS autodial printer where lab reports are printed. SDA physicians also have access to lab reports via DLS web site.
- American Medical Center, Med First Clinic, Health Partners Clinic and ITC clinic, currently use a small EMR called Alta Point. DLS was informed that this EMR does not have the capacity to accept files for lab reports.
- The three (3) Guam Public Health Centers do not currently have EMR's or LIS.
- DLS lab reports are sent via autodial printers and their physicians have access to DLS web site reports.
- Northern Community Health Center is looking into possibility of purchasing EMR.
- FHP Medical Center is still choosing which EMR to get. In the meantime, lab reports are printed via DLS autodial printers and their physicians have access to lab reports via DLS web site.

3.12 Medicaid Readiness

Medicaid in Guam has submitted a grant request to write their State Medicaid Health Information Technology Plan (SMHP) and I-APD. Until that is approved by the Medicaid regional office in California, it is challenging for Medicaid to participate with the GeHC and exchange information electronically. Medicaid is still not automated and they have requested funds from Medicaid to help modernize their systems. However, they need assistance in upgrading and modernizing their systems. Having the capability to exchang data and information electronically may be 2 – 3 years out.

3.13 Public Health Readiness

The Guam Division of Public Health is primarily paper based for many activities with limited ability to move data electronically. An example of how antiquated their system is, for fulfilling their requirements for reporting communicable diseases, a Public Health physician travels to Guam Memorial Hospital each afternoon and reviews the log book to see if any cases were reported that day. Public Health has purchased a Communicable Disease Reporting System (CDRS) but it is not yet operational.

Public Health has a web based immunization registry that allows them to track immunizations. They are using the Envision System as are several nearby territories.

Public Health understands the need to participate in health information exchange and is prepared to do so but may be limited by available funding.

3.14 Health Plans Readiness

In Guam, there are four primary payers in the commercial insurance market. They are primarily based in Guam and cover the island as well other territories such as Saipan. The carriers are:

- Select Care
- Stay Well
- Net Care
- FHP – Take Care

All of the carriers have the ability to accept claims electronically but only about 10% are submitted electronically. It was reported that Guam is about five years behind Hawaii and twelve years behind the mainland in the use of health care technology. Therefore, it is difficult for the providers to submit claims electronically. All of the payers see the benefits of HIT and HIE and are advocates for this project.

4.0 Medicaid Coordination

The Medicaid Bureau in Guam is currently using manual processing for its claims. It receives between 160,000 and 200,000 claims per year. Because of the slowness of the system, most providers in Guam do not accept Medicaid. They are reportedly acquiring a new system (PH Pro) when funding is approved, likely in late 2010. In the meantime, Medicaid continues to struggle with prompt payments.

In addition, given the lack of specificity around completing the State Medicaid Health Information Technology Plan (SMHP) and I-APD, it is difficult to ascertain when and how ARRA incentive payments may be dispersed in Guam. Given up to 50% of the Guam population may be Medicaid eligible and most providers don't accept Medicaid, it is probable that some of them are not receiving the care they require.

4.1 Integration Between HIE and SMHP

Medicaid is one of the Divisions under the department of Public Health and Human Services. Serving under a common Director will enable the coordination and integration between Medicaid and GeHC. GeHC is prepared to assist Medicaid with its transformation to an electronic claims system and with integration between the HIE and Medicaid. It will be dependent on Medicaid to work with GeHC to integrate both efforts.

4.2 Measures of Provider Participation

The Medicaid Bureau in Guam has not completed any analysis regarding the number of eligible providers that may apply for the Medicaid incentive program. Guam ranks near the bottom of various measures of poverty in the United States. Estimates of Medicaid eligibility approach 50% of the population. Therefore, a significant number of physicians who accept Medicaid patients may be eligible for incentives.

Provider adoption is critical and the Medicaid Bureau should work closely with the Regional Extension Center and GeHC to accelerate adoption. Provider adoption of EHR technology is viewed as a key component of achieving Meaningful Use. Achieving Meaningful Use is viewed as key to improving the overall health of people in Guam and lowering health costs in the territory.

4.3 Governance Structure

Medicaid is managed by the Department of Public Health and Human Services. The Director reports directly to the Governor.

4.4 Coordination of Provider Outreach

The Medicaid Bureau has done very little to reach out to providers. They claim to have distributed materials on the incentive program to providers via fax. During the Environmental Scan process, all interviewees were asked about receiving information from Medicaid. All of the interviewees indicated they were not familiar with any Medicaid materials being received by them.

4.5 Collaboration with Regional Extension Centers

The regional Extension Center serving Guam is based in Hawaii at the University of Hawaii – Manoa. The Telecommunications Information Policy Group was awarded the grant to serve Guam. To date, they have had one meeting with the Guam HIT Director by teleconference. The REC has not yet made a visit to Guam but the services are needed. Collaboration between the REC, Medicaid and GeHC is limited. The REC has indicated it will have difficulty providing any services to Guam other than web-based, and the effectiveness of this education and outreach will be significantly limited.

4.6 Coordination with ONC Funded Workforce Project

No workforce development activity was funded for Guam.

4.7 Alignment of HIE and Medicaid Efforts with Meaningful Use

As the HIE governing entity, GeHC is aware of the Meaningful Use requirements and is prepared to assist Medicaid in any way possible to align efforts.

4.8 Coordination and Alignment of Various Efforts

4.8.1 Needs Assessments

GeHC will coordinate with Medicaid when funding is made available and Medicaid is prepared to modernize its operations.

4.8.2 Environmental Scan

The Medicaid Bureau will be offered the use of the GeHC Environmental Scan as the baseline for information during the SMHP process.

4.8.3 Regional Extension Centers

Information regarding the collaboration between the Medicaid Bureau and the REC is described in detail in 4.5.

4.8.4 Privacy and Security Policies

The Medicaid Bureau, in carrying out activities for the EHR Provider Incentive Payment Program will adhere to any and all privacy and security laws, rules and regulations required by CMS, HIPAA and any others that pertain to the exchange and protection of healthcare information. All personnel from the Medicaid Bureau will use all of these policies and procedures to meet all privacy and security requirements.

4.8.5 Infrastructure

The Medicaid Bureau will use the existing infrastructure and resources to carry out the EHR Provider Incentive Payment Program. The exceptions would be the development of a Medicaid HIT web page, which may become a required portal if needed to interface with the National Level Registry (NLR).

4.8.6 Operational Collaboration

As mentioned in the sections above the Medicaid Bureau as a Division under the Department of Public Health and Human Services will work closely with all other Divisions within the Department.

4.8.7 Payment Incentives

The Medicaid Bureau is still in the process of developing its process to determine eligible providers. In addition, Medicaid is beginning to work to establish the criteria for providers to become eligible to receive an incentive payment. At this stage, Medicaid has not identified the estimated payments that may be required under this program but will continue to work at determining the estimated payments.

4.9 Measures of Provider Participation and Adoption

Health Information Technology is frequently associated with efficiencies and cost reduction/ avoidance plans. Electronic Health Record technologies will serve as the foundation for a creating a number of these efficiencies. However, these technologies will not attain the efficiencies desired if providers do not adopt EHR technologies and use them as a part of their clinical workflow. Only by significantly increasing provider adoption rates can these efficiencies be realized.

Given the limited assistance currently being received from the REC in Hawaii, the Medicaid Bureau may be required to develop its own assistance program for providers. GeHC and Medicaid will need to work cooperatively to provide materials and tools in order to achieve the early adoption of EHR technology. These tools and materials are described below:

- EHR Assessment/Analysis – There are currently over 360 EHR products on the market today. It is anticipated that as many as 50 – 60 may receive certification within the next few months. Providers are not willing or equipped to assess the various attributes of all these products to determine which one is most suitable for their practice. Different EHRs fit different specialties and clinical workflow styles. In order to choose the right solution for each provider, it will be necessary to do an assessment of these products and analyze the ones that best fit different specialties and workflows.
- Vendor Selection – This is a tool that practices may use to assist them with the complicated process of selecting an EHR vendor. Knowing the key functionalities to look for in the selection process and how to negotiate with vendors is critical information providers will need in order to make a successful transition to EHR technology.
- Data Use Agreements – There are several different data use agreement templates in use today. It is important for providers that wish to participate in the exchange of information and use the HIE to accomplish this task to be able to have data use agreements that fit the legal structure of Guam.
- Business Associate Agreements - Same as data use agreements above
- Practice and Workflow Redesign – Providers do not have the skills to do their own workflow redesign. The REC is developing these services and will need to have a fully functioning methodology to assist providers to adopt EHR technology, transform their practice, meet Meaningful Use requirements and receive their ARRA stimulus funds. This is a key area where long-distance or web-based interactions will be of limited use.

- Privacy and Security Best Practices – Currently, there are very few experts in privacy and security working in the field. Having access to an individual with these specific skills is important to identify and implement best practices.

In addition to the knowledge tools articulated above, GeHC and Medicaid will also need additional knowledge materials that provide an initial understanding of HIT, EHR and ARRA for all providers as they begin the process of adopting, upgrading, enhancing and implementing technology. These materials include:

- HITECH/Meaningful Use – Providers need a basic education about HITECH, ARRA, Meaningful Use and HIE. Overall, there is a general lack of knowledge in the provider community about all of these topics and it will be critical for GeHC to provide this information to providers.
- ARRA/Stimulus Funding – Same as above.
- HIE Integration – Understanding how this electronic data interconnects, how privacy and security is protected, and where the provider fits into the bigger picture will be important to obtaining broad usage of electronic health records.

There are also several other opportunities for improving the adoption rates and increasing the likelihood of improved efficiencies for the whole system. These areas of opportunity include:

- Providers are very focused on the clinical aspects of EHRs in their selection process and many providers are not aware of additional modules in the Electronic Health Record that can impact their practice, including administrative modules with the ability to output and submit clean, HIPAA-compliant claims (and output/input other 'clean' administrative transactions, such as HIPAA compliant eligibility transactions, claims status, prior-authorization, etc) to payers.
- Providers are still migrating to and working on electronic processes for administrative transactions, and in some states with some Medicaid systems, the submission rates (of electronic, HIPAA-compliant claims) are low, and the rejection rate of HIPAA-compliant electronic claims is high.
- Providers are examining options for EHRs, and can be overwhelmed with the number of vendors, offerings, and the overall selection process.

A significant win for all the stakeholders, including GeHC and Medicaid as well as the providers, is the ability to adopt modern, effective technology solutions that not only meet clinical needs and requirements but also solve the ever-persistent business and administrative challenges at the same time. As an example, when a provider is looking to move from a paper based process to a modern electronic health record, the provider can also add administrative components and modules, insuring an upgrade of the entire workflow (from clinical to administrative transactions) with modern, efficient systems. Thus, the provider now has the ability to have an upgraded, entirely electronic workflow, including the submission of HIPAA-compliant and tested claims to the State Medicaid and federal Medicare systems. The impact from providers upgrading their systems with options/optional modules as they select and implement their EHRs can be significant.

- Providers can output and submit clean, tested and compliant claims to Medicaid, insuring faster payment and fewer rejections.

- Medicaid can accept more electronic claims, reject fewer claims, gain efficiencies and streamline workflows along with higher submission of claims and lower rejection rates (although Guam Medicaid Bureau currently has no electronic systems or processes).

Adoption rates of comprehensive technology solutions, such as EHRs with administrative modules, can be raised significantly with proper, deeper education of the providers in concert with education and strategy planning by the combined resources of GeHC and Medicaid. By providing further provider-based education for migrating to a modern, effective clinical (EHR) solution with optional administrative modules, the provider, the GeHC, and Medicaid can realize cost savings, workflow improvements, and overall payment process improvements, making a significant impact on the entire system.

HIT adoption will also be driven by the willingness of physicians and other health care providers in the Territory of Guam to adopt and use these new technologies. In many ways, this makes HIT adoption a large scale change management project. The HIE Strategic and Operational Plan as well as the State Medicaid Health Information Technology Plan (SMHP) must reflect a clear and actionable processes for achieving significant adoption rates.

Dr. David Blumenthal, National Coordinator for Health Information at Department of Health and Human Services recently stated "People working in health IT should think about electronic health records not as a technology project but as a change management project. Components of Meaningful Use include sociology, psychology, behavior change and the mobilization of levers to change complex systems and improve their performance". Awareness of the resistance to change will inform all procedures, process and policies for improving provider adoption in Guam.

It is important for GeHC and Medicaid to address these concerns and offer solutions. Adoption will be much easier if strategies are developed to address and overcome stakeholder concerns early in the process. Four simple change management elements to include in the adoption process are:

- Follow a proven change management process
- Use the tools and materials described above
- Provide the proper education and training to stakeholders
- Continually connect the change with the stakeholders' own value proposition

Using these techniques to successfully manage change will improve the overall provider adoption rate. Applied early in the change process they can result in success for the proposed changes. These successes can be a powerful tool for obtaining the support of other stakeholders as they adopt the EHR technology. The earlier the adoption, the larger the resulting benefit to all stakeholders.

5.0 Coordination of Medicare and Federally Funded, State Based Programs

5.1 Medicare Coordination

The Territory of Guam recognizes that coordination with Medicare is of critical importance, therefore GeHC will deploy an NHIN Gateway based upon the CONNECT protocols, to enable direct connectivity with Medicare over NHIN for both clinical and administrative transactions for GeHC. As Medicare and CMS as a whole are migrating towards NHIN, it is critical for the GeHC to have direct, NHIN-based connectivity with Medicare (and CMS), thus, enabling a CONNECT compliant NHIN Gateway connecting the GeHC to Medicare and CMS.

GeHC will also assist as necessary with provider connections to the National Level Registry (NLR) to give providers who are seeking ARRA stimulus funding a pathway to CMS.

5.2 CDC Coordination

A national initiative of the Centers for Disease Control and Prevention (CDC) is to enable real-time, interoperable data exchange between organizations for the promotion of collaboration and rapid dissemination of critical information in the organizations associated with public health.

The integration and alignment of the GeHC Strategic and Operational Plan to include Public Health reporting and surveillance to the CDC over NHIN, coordinating with senior staff at CDC and Public Health Agencies, as well as ONC and Health and Human Services (HHS), is critical to the development and full deployment of health information exchange. The CDC fully supports and endorses NHIN, and encourages Public Health Departments to fully participate in HIE Strategic and Operational Plans as well as the NHIN for connectivity and interoperability.

The GeHC and the Guam Public Health Department are reviewing connectivity and reporting standards, including considering the implementation of the Geocoded Interoperable Population Summary Exchange (GIPSE) format of syndromic surveillance information to the CDC, complying with NHIN standards for connectivity and interoperability to and with the CDC. The GIPSE format is designed to allow the electronic exchange of health condition/syndrome summary data that has been stratified by a number of variables. The GIPSE Data Content and Data Format Groups, a collaborative effort among the CDC HIE Project Awardees and National Center for Public Health Informatics (NCPHI), developed and continues working on the GIPSE standard. The GIPSE standard will be utilized by Public Health to conduct situational awareness, including early event detection and monitoring, for potential public health events.

5.3 CMS/ASPE Coordination

The integration of GeHC with the Center for Medicare and Medicaid Services (CMS) will enable electronic quality reporting over NHIN, as ordered by the American Recovery and Reinvestment Act (ARRA). The standards for quality reporting are defined by the ONC and CMS. The ability of states to report data to CMS through the HIE and NHIN is an essential component for achieving Meaningful Use.

5.4 HRSA Coordination

The Health Resources and Services Administration (HRSA) is the primary federal agency for improving access to healthcare services for low income and uninsured individuals. The role of the statewide HIE in alignment with HRSA includes ARRA funding to expand resources and services available to the low income and uninsured individuals.

5.5 SAMHSA Coordination

The Substance Abuse and Mental Health Services Administration (SMHSA), an agency of HHS, focuses attention, programs and funding on improving the lives of people with or at risk of mental and substance abuse disorders. Many states have state laws that provide heightened privacy and protection for the disclosure of certain types of health information, such as substance abuse, sexually transmitted diseases, genetics, and mental health and developmental disabilities in children and adults that cannot be shared with other healthcare providers without written patient consent. The Territory, if applicable, must comply with these laws accompanied by much higher privacy standards, even if the disclosure of information would otherwise have been permitted under HIPAA Regulations without patient consent or authorization. GeHC will coordinate with the Behavioral Health Authority to ensure that specific standards for Substance Abuse and Mental Health records are included in the GeHC operational policies and procedures for in-territory and out-of-state disclosures.

Please see Section 13 for additional information.

6.0 Participation with Federal Care Delivery Organizations

6.1 Department of Defense Coordination

There are two major military installations in Guam. One is an Anderson Air Force base and the other is the US Naval Base Guam. The military is usually interested in receiving information about the off base treatment of military personnel but are unable to connect to the GeHC due to severe security constraints. Therefore, it is recommended that the exchange of healthcare information is done through the Nationwide Health Information Network (NHIN) by connecting with the Department of Defense using secure protocols and standards.

6.2 Veterans Administration Coordination

There is one large Veterans' clinic under construction in Guam. GeHC is aware of the Department of Defense and the Veterans Administration development of the Virtual Lifetime Electronic Record (VLER) and will support future connections through the Guam HIE NHIN Gateway.

6.3 Social Security Administration Coordination

GeHC is familiar with the Social Security Administration (SSA) and the existing SSA NHIN project for Disability Benefit Eligibility Determination utilizing NHIN. GeHC recognizes the importance of utilizing NHIN-based connectivity to and with the SSA, and the impact on disability beneficiaries of connecting to SSA and bi-directional, electronic exchange of data across and using NHIN, versus utilizing existing paper based workflows and communication mechanisms.

GeHC will implement a CONNECT NHIN Gateway for bi-directional clinical and administration exchange over the Nationwide Health Information Network, the addition of SSA as a trading partner (with CCD) will be added to the GeHC roadmap, to allow future SSA disability benefit eligibility verification over NHIN, in an electronic CCD format. Therefore, GeHC will support direct, HIE to SSA connectivity over NHIN to migrate paper based eligibility transactions to electronic transactions over NHIN.

7.0 Coordination with Other ARRA Programs

7.1 Regional Extension Center Coordination

During the summer of 2009, the Department of Health and Human Services through the Office of the National Coordinator for Health Information Technology issued a competitive funding opportunity titled, *American Recovery and Reinvestment Act of 2009, Heath Information Technology Extension Program: Regional Centers*. The funding opportunity announcement sought to identify and fund qualified entities to serve as Regional Centers within the Extension Program. The purpose of the Regional Centers is to furnish assistance, defined as education, outreach, and technical assistance to help providers in their geographic service areas select, successfully implement, and meaningfully use certified EHR technology to improve the quality and value of health care. The Regional Centers were also tasked to help providers achieve, through appropriate available infrastructures, exchange of health information in compliance with applicable statutory and regulatory requirements, and patient preferences.

The program requires the Regional Extension Centers to give priority to providers that are primary care providers in the following settings: individual and small group practices with ten or fewer professionals with prescriptive privileges primarily focused on primary care; public and Critical Access Hospitals; Community Health Centers and Rural Health Clinics; and other settings that predominantly serve uninsured, underinsured and medically underserved populations. The primary measure of a Regional Extension Center's effectiveness is whether it has assisted providers in becoming Meaningful Users of certified EHR technology. The original projects indicated that each Regional Extension Center would be expected to provide federally supported individualized technical assistance to a minimum of 1,000 priority primary care providers in the first two years of the four-year cooperative agreement project period. At the national level, the Regional Extension Centers are expected to support over 100,000 priority primary care providers in the aggregate.

The successful applicants joined the collaborative learning network which is a consortium facilitated by the Health Information Technology Research Center (HITRC) where lessons learned by all of the Regional Extension Centers about effective practices in provider implementation and use of EHRs will be shared. Each cooperative agreement entered into by the Regional Centers with ONC consists of a four-year project period with two separate two-year budget periods. Non-competing continuations for the second two-year budget period are contingent upon the performance of the individual Regional Extension Center and a determination by HHS that such continuation of the cooperative agreement with a given center is in the best interest of the program.

The Regional Extension Centers are expected to work with both priority primary care providers who have not yet adopted EHR systems, and with priority primary care providers who have existing EHR systems to assist them in achieving Meaningful Use of a certified EHR. The scope of services includes:

- Education and Outreach to providers, including dissemination of knowledge about the effective strategies and practices to select, implement, and meaningfully use certified EHR technology to improve quality and the value of healthcare.

- National Learning Consortium, through which the Regional Extension Centers will become members and use the client management, tracking, and reporting application furnished by HITRC to provide ongoing data in support of ONC's monitoring, oversight and continuous implement of the Extension Program as well as to make their materials available to other Regional Extension Centers.
- Vendor Selection and Group Purchasing, including assistance in assessing the health IT needs for priority primary care providers and selecting and negotiating contracts with vendors or resellers of EHR systems, hardware, networking and IT services.
- Implementation and Project Management over the entire EHR implementation process, including individualized and on-site coaching, consultation, troubleshooting and other activities required to assure that the supported provider is able to assess and enhance organizational readiness for health IT, assess and remediate gaps in IT infrastructure, configure the software to meet practice needs and enable Meaningful Use, and ensure adequate software training is delivered for all staff.
- Practice and Workflow Redesign necessary to achieve Meaningful Use of EHRs.
- Functional Interoperability and Health Information Exchange by enabling primary care providers to connect to available health information exchange infrastructure(s).
- Privacy and Security Best Practices including implementation and maintenance of physical and network security, user-based access controls, disaster recovery, encryption and identification of state laws and regulatory requirements that impact privacy and security policies for electronic interoperable health information exchange.
- Progress Towards Meaningful Use by helping priority primary care providers to understand, implement technology and process changes needed to attain Meaningful Use requirements and demonstrate this attainment.
- Local Workforce Support, by partnering with local resources such as community colleges to promote the integration of health IT into the initial and ongoing training of health professionals and supporting staff.

It has been announced that the University of Hawaii, Manoa Campus, Department of Telecommunications and Information Policy Group (TIPC) has been selected by the Department of Health and Human Services to operate the Regional Extension Center to assist primary care physicians in Guam. The TIPC Regional Extension Center's has not visited Guam and has not provided the expected assistance to date.

7.2 Workforce Development Coordination

It is unknown who the Workforce Development partner for Guam is or how to get in contact with them.

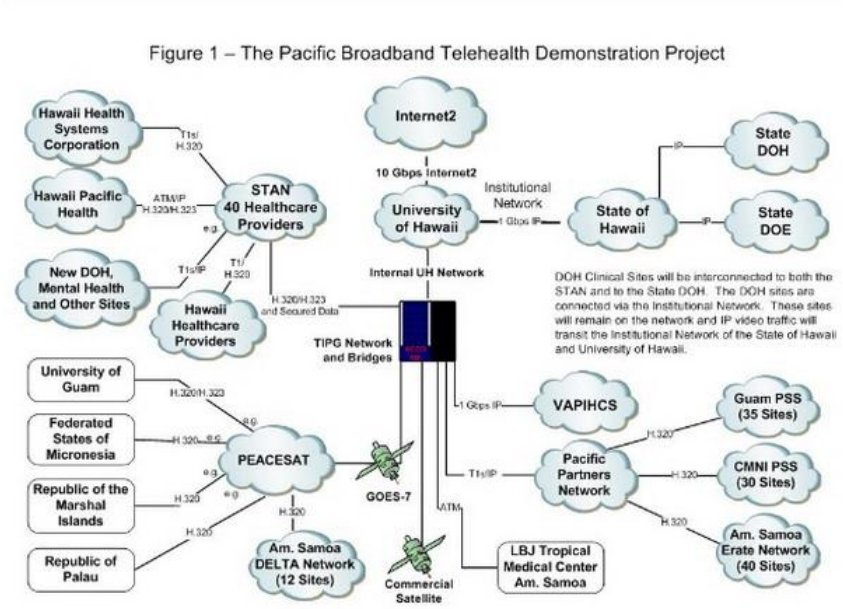
7.3 Broadband Mapping and Access Coordination

Broadband is generally available in Guam and described in detail in Section 3.8.3 above. In addition, the university of Guam is participating in a grant with the University of Hawaii to expand Broadband in the Pacific region as described below.

The Federal Communications Commission (FCC) announced on November 19, 2007 a $4.8 million grant award for a Pacific Broadband Telehealth Demonstration Project. The FCC Funded Project will expand the State Telehealth Access Network and Department of Health

networks by cross-connecting and increasing the capacity of the networks of many other partners, including the University of Hawaii, the Hawaii Health Systems Corporation, the Hawaii Pacific Health, the U.S. Department of Veterans Affairs, and many other health care providers. The expanded network will serve as a core network to support telehealth, telemedicine, and electronic health record (EHR) capabilities in Hawaii and several locations in the Pacific Island region including Guam.

Figure 2 Broadband Telehealth Demonstration Project



7.4 Beacon Communities Coordination

There were no Beacon Community Grants awarded to Guam

8.0 Multi- State Coordination

8.1 Philippines, American Samoa, NMI, and Saipan

Healthcare involving specialties not available in Guam usually requires patients to seek treatment off-island. It is estimated 8% - 12% of all patients receive treatments outside of Guam. Given the close proximity to the Philippines, the relative affordability and the availability of nearly all specialties, patients from Guam frequently seek treatment in the Philippines. Patients usually seek treatment at one of three facilities in the Philippines. However, other facilities may also be used depending on the diagnosis. Therefore, having connections to the Philippines is an important consideration for the citizens of Guam.

In the reverse case, patients from American Samoa, Northern Marianas Islands, the Republic of Palau, the Republic of the Marshall Islands and Saipan frequently seek treatment in Guam. The ability to exchange clinical information between all of these countries and territories is important for continuity of care purposes.

8.2 Other State Connections

Occasionally, Guam patients are referred to Hawaii and/or the mainland United States. California is the most frequent destination outside of Hawaii. Connections to these states will be facilitated by using the NHIN.

8.3 Standards Based Connectivity to Other States

GeHC will be implemented based on NHIN standards and will connect to all other state HIEs as well as federal entities connected to the NHIN. It is the intent of the GeHC to subscribe to all NHIN CONNECT standards as well as IHE standards to maintain connectivity to other states, federal agencies and other entities willing to exchange healthcare data and information across the NHIN.

8.4 NGA Meetings and Participation Including Medicaid

The Territory of Guam is currently participating in regular meetings with the National Governors Association (NGA) to integrate HIE work with other states. The Guam Department of Medicaid also participates in these meetings and the Territory and Medicaid will work closely together to coordinate efforts within Guam as well as between other states.

8.5 TIPC

As described in Section 8.4 above, TIPC has been chosen as the regional Extension Center for Guam. Providing assistance to Guam's health care providers to improve quality and patient outcomes through the adoption and Meaningful Use of electronic health records is the job of TIPC. It is unclear TIPC's plans to provider REC services to Guam. The HIT Director for Guam will connect with TIPC and ask them to bring the required services to Guam.

8.6 HIE Collaboration

The Territory has a direct interest in exploring all collaboration opportunities with other states. Guam will, as a part of this Strategic and Operational Plan, specifically reach out to American Samoa and NMI and Saipan to seek any and all collaboration opportunities and will continue to

explore areas where the Territory can work with other states to control costs and/or increase revenue opportunities.

9.0 Governance Domain Team

9.1 Governance Entity

GeHCs believes Executive Order 2009-12 provides the initial structure for the Guam e-Health Collaborative The statute provides for initial start up of operations and ongoing management of GeHC. The Board consists of fifteen members who represent various healthcare stakeholders which include:

- Department of Public Health and Social Services
- Guam Memorial Hospital Authority
- Department of Mental Health and Substance Abuse
- Bureau of Information Technology
- Guam Retirement Fund
- Guam Medical Association/Society
- Guam Nursing Association
- Guam Pharmacists Association
- Guam Legislature
- Department of Administration
- Bureau of Budget and Management Research
- Health Insurance Company
- Chamber of Commerce
- Representative(s) identified by Collaborative

Executive Order 1009-12 authorizes the Board to hire an Executive Director and provides the Board with the oversight responsibility for the statewide HIE. Duties include:

- Initiating the statewide health information exchange
- Promoting more efficient and effective communication among multiple health care providers and payers
- Creating efficiencies by eliminating redundancy in data capture and storage and reducing administrative, billing and data collection costs
- Creating the ability to monitor community health status
- Providing reliable information to health care consumers and purchasers regarding the quality and cost-effectiveness of health care, health plans and health care providers
- Promoting the use of certified electronic health records technology in a manner that improves quality, safety, and efficiency of health care delivery, reduces health care disparities, engages patients and families, improves health care coordination, improves population and public health, and ensures adequate privacy and security protections for personal health information

The GeHC Board has agreed that the Executive Order provides the direction and information necessary to establish the initial leadership. However, it is important for GeHC to have access to professional assistance as the health information exchange is designed and implemented. Therefore, the GeHC Board has identified the following strategies for moving forward.

9.1.1 HIE Governance

- Convene the Board of Directors upon submission of the Strategic and Operational Plan
- Appoint eight (8) Domain Teams to assist with the implementation process including:
    - Governance
    - Finance
    - Technical Infrastructure
    - Business and Technical Operations
    - Legal and Policy
    - Communications
    - Consumer and Provider Adoption
    - Clinical
- Define the charters for each Domain Team and assign them specific responsibilities for assisting the Board
- Contract with an outside consulting expert to help facilitate the process

9.1.2 Roles and Responsibilities

Roles and responsibilities for the Board of Directors include:

- Writing a comprehensive requirements document for building and operating the Health Information Exchange (HIE)
- General oversight of the construction and operation of the HIE
- Control of all revenue and expenditures
- Policy setting and adherence to territory personal practices
- Compliance with Health Information Portability and Accountability Act (HIPAA)

9.2 Long-Term Commitment

Exchanging health information is a process that can take time to implement. From the point in time the territory decides HIE is of value and wishes to exchange information across the territory, it can easily take up to three years before any meaningful quantity and quality of data can be exchanged. Identifying the best information to exchange, getting stakeholders to commit to exchanging information, and building an operational exchange takes time and patience. During this lengthy process, it is important for GeHC to maintain its connection with all stakeholders and keep them engaged in the process. Given the relative small size of Guam, many of the key stakeholders are in frequent communications. The strategies for ensuring stakeholders are committed for the length of the process includes:

- Secure long-term commitments for key stakeholders at the beginning of the process
- Continuously link HIE activities to the value proposition for each stakeholder
- Establish clear and measurable timeframes for the design and implementation of the HIE and adhere to these timelines
- Create a strong project management plan and authorize the territory HIT Director to closely manage the project

9.3 HIE Accountability

9.3.1 Privacy and Security

The primary responsibility for GeHC is the protection and safeguarding of patient data and information. The GeHC will comply with all HIPAA regulations as well as with all Guam legislation related to the protection of patient data and information.

9.3.2 Interoperability Standards

GeHC will be constructed in accordance with all current interoperability standards including NHIN, IHE, and CCD.

9.3.3 Fiscal Integrity

GeHC will operate in accordance with Generally Accepted Accounting Principles (GAAP) standards. GAAP requires regular reporting and fiscal integrity in all transactions. GeHC will adhere to these accounting principles in all business related matters.

9.3.4 Transparent Accounting

In accordance with the principles outlined in Section 2.5, Principles, as well as Section 9.3.3, all accounting will comply with the following:

- Guam Open Meeting regulations
- Openness and Transparency
- Stakeholder accountability requirements
- Consumer trust

9.4 Trust

The Environmental Scan identified several trust issues across Guam. The following strategies will be employed to address the six areas of trust previously identified.

9.4.1 Consumer Trust

Consumers have concerns about HIE. The following strategies for building trust with consumers in the HIE will be employed:

- Consumer education
- Adherence to privacy and security policies
- Consistent and frequent communications and education about the process
- Inclusion of additional consumer groups in the construction process Develop a clear process for accountability to stakeholders

9.4.2 Generational Trust

Technology is generally more difficult for older Americans to trust than for younger generations. The following strategies for building trust between different generations using HIE services will be employed:

- Provide additional support and education for older consumers
- Consistent and frequent communications and education about the process
- Link to the consumer groups described above for better understanding of the value of the HIE

- Present educational seminars to senior groups where they meet regularly (i.e. County Aging Services, AARP, Meals on Wheels, Senior Centers, etc.)

9.4.3 National Trust

The federal government is playing a much more active role in defining healthcare in America today. The following strategies for building trust with Federal Agencies will be employed:

- Adopt and adhere to the Data Use Reciprocal Support Agreement (DURSA)
- Create a simple form for Guam stakeholders to use that binds them under the state DURSA agreement
- Identify and adopt standard Business Associate Agreements for use in Guam
- Identify and adopt standard Data Sharing Agreements for use in Guam

9.5 HIE Transparency and Openness

The following strategies for engaging consumers in the HIE creation process will be employed:

- Coordinate with various consumer groups (AARP, Chambers of Commerce Health Care Committee, Faith-based groups, etc.) for input and involvement
- Leverage the current consumer outreach programs and processes already in place by the major healthcare facilities across the state
- Appoint a consumer advisory task force

9.6 Nationwide Health Information Network (NHIN) Participation

GeHC will participate in the Nationwide Health Information Network (NHIN) and will comply with all standards for connecting. It is the intent of GeHC to adopt the DURSA as described in Section 9.4.3 above.

9.7 State Health Information (HIT) Coordinator

The state HIT Director, Alfred Duenas was appointed by Governor Felix P. Camacho as the Territory of Guam Health Information Technology Coordinator in early 2010. Director Duenas works with the Director of IT from the Guam Department of Public Health and Human Services to manage the day-to-day work activities of the office on Health Information Technology and Exchange. In order to establish appropriate policies and procedures for accomplishing the work of the HIT office, GeHC will employ or has employed the following strategies:

- Establish a set of clear expectations for the HIT Director that empower him to implement the Strategic and Operational Plan
- Create a policy manual outlining the work responsibilities of the HIT Director, the annual planning process used by GeHC to set annual goals and objectives for the Director, and an annual performance appraisal process
- Appoint a subcommittee of the GeHC Board to complete an initial set of recommendations to establish policies for the management of the HIT Director's office.

As noted in Sections 6, 7, 8, and 9 above, the Strategic Plan sets forth how the HIT Coordinator will coordinate with all federally funded programs and HIE activities within the State.

10.0 Finance Overview

10.1 Overview

Dr. David Blumenthal, National Coordinator for Health Information at Department of Health and Human Services recently stated, “People working in health IT should think about electronic health records not as a technology project but as a change management project. Components of Meaningful Use include sociology, psychology, behavior change and the mobilization of levers to change complex systems and improve their performance”. The information contained in this document is designed to accommodate the need for people to acclimate to the changes brought about by technology and discover a financially sustainable plan for Health Information Technology.

In order to create an acceptable financial model, stakeholders need to provide data and information about their current and planned operations. In many instances, stakeholders may be competitors and therefore reluctant to share their data and information. Using a third party consultant that is viewed as a trusted resource by all stakeholders is critical to obtaining the required data and information. In order to be reasonable, the financial model must be handled using a process of obtaining the information, analyzing it, reporting it and discussing it privately while maintaining the confidentially of the information for each stakeholder.

Once the financial model is built, there must be a mechanism for changing it as the environment changes. In addition, it must accommodate input in various forms from diverse stakeholders. A set of “dashboard” type applications to collect, analyze, manipulate, and report key financial indicators can be useful in modeling various financial scenarios. These tools are relatively common in the private sector and can be easily adapted for use in healthcare. They will allow decision makers to input data and information, change assumptions and strategies, and immediately see the impact on the underlying financial model.

In summary, it is critical to start with solid data and information. This can only be obtained if a certain level of trust exists with the stakeholders. Therefore, it is important to start the HIE process with an open and transparent process that builds trust from the beginning. When trust is developed, then reliable financial information can be collected, analyzed and reported.

10.2 Trust

Successful financial modeling is built on four key factors:

- Building trust with the diverse stakeholder group
- Obtaining closely held reliable data and information from each stakeholder
- Determining the revenue structure and establishing the types of income that will be used to support HIE operations
- Analyzing the data and information and creating pro-forma budgets and income projections

The basis for building a robust business and financial plan is reliable financial data and information as described above. Having trust is necessary to create a credible business plan with key financial metrics that all stakeholders can endorse.

Another critical element in building a sustainable plan is determining the right mix of revenues that are supported by the stakeholders. Revenues can come from a variety of sources. Direct revenues may include fees, subscriptions, grants, sales of de-identified data and information, and future fee for service income. Indirect revenues can come from operational savings and lower costs. To create a sustainable model, all sources of direct and indirect revenue must blend together and create the optimal mix that can be supported by diverse stakeholders.

10.3 Success Factors

Research into both the successful and unsuccessful HIE efforts across the country over the past several years reveal two facts: 1) HIE's that were created using internal stakeholder funding have a higher probability of success and 2) the costs / benefits of HIE are not distributed equally to all stakeholders.

Success in building sustainable HIE's rests on two key factors:

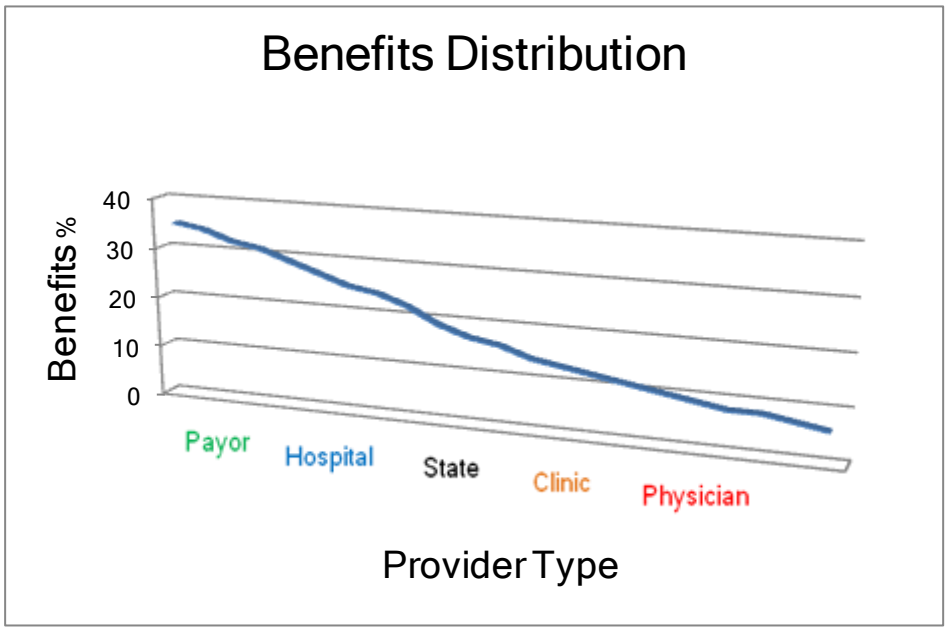
- Determining the optimal mix of funding from multiple sources
- Reaching agreement on a plan for the equitable sharing of benefits

First, internal stakeholder funding is the single best financial resource. Creating financial models that address the value proposition for each stakeholder is the first step in identifying internal funding sources. Showing a return on investment (ROI) that is connected to the value proposition will engage stakeholders faster than any other motivating factor.

Second, because benefits are not distributed equally, the financial model must show who benefits the most and the least. Some stakeholders may benefit from significant cost savings in some areas while others may see their costs increase slightly. It is important to reach consensus on how these costs / benefits will be shared between stakeholders. That is why it is critical to develop trust early in the process.

Based upon the existing research, it is possible to graph the potential cost savings benefits or the revenue benefits for the various stakeholder groups. Including the stimulus funds available for physicians and hospitals, the following graph projects one possible scenario for how key stakeholders may benefit from the adoption of electronic health records and the use of the health information exchange. While the actual benefits will likely vary from this graph, the intent is to describe how different stakeholders benefit differently and to use this knowledge to help analyze and establish equitable fees for all stakeholders.

Figure 3 Benefits Distribution



10.4 Project Risks

Changing environmental factors may create risks to the implementation of the strategic plan as designed. Anticipating and identifying these risks can help determine the impact to the plan. Therefore, it is important to consider the potential project risks and to develop a mitigation strategy with accountability to avoid them. In this Section, the risks are identified and in Section 14, the mitigation plan is discussed.

Successful risk mitigation is built on six key factors:

- Identifying potential risks and determining their impact of the project
- Establishing key metrics to measure the impact
- Creating project milestones and trigger points where go / no-go decisions will be considered
- Developing a timeline to demonstrate progress
- Building stakeholder accountability in to the Strategic and Operational Plan for the HIE effort
- Reporting results on a regular basis and identifying variances to the plan with actions to reduce or eliminate the variance

Risk mitigation involves the identification of risk and the development of strategies to manage and reduce or eliminate it. Generally, risk mitigation involves these steps:

- Identification of risk and issue scope.
- Process planning through open discussion, this may involve determining the objectives of the diverse stakeholders
- Analysis of risks involved in the process
- Mitigation of risks using available resources

- To ensure that possible risks reach the attention of key stakeholders, risk factors are identified in regular Project Status Reports.

There is no question the environment will continue to evolve during the various stages of HIE implementation in Guam. Stakeholders will change and financial commitments will ebb and flow depending on a variety of factors. Knowing this to be true and creating a business and financial plan that has the flexibility to adjust and continue to move forward is key. The three most important factors in maintaining commitment over a long-term project are:

- Demonstrating a clear ROI connected directly to each stakeholders' value proposition
- Trust - between the stakeholders and with consumers
- Using a proven change management process

If these three factors are in place, the probability of success rises significantly.

In addition, the following risks have been identified that could cause problems for attaining financial sustainability.

10.4.1 Adoption Risks

The following adoption risks were identified as potential barriers to building a successful HIE in Guam:

- Agreement of the stakeholders in Guam to participate in the HIE
- Setting achievable expectations for adoption over a five year time frame
- Failure of the HIE system to respond quickly to stakeholder inquiries
- Initial operating costs are unsupportable in the first three years

10.4.2 Political Risks

The following political risks were identified as potential barriers to building a successful HIE in Guam:

- Legislative support and funding
- Lobbying by various groups that may resist the changes that are required to successfully operate the HIE
- Resistance from various impacted territory agencies
- Lack of cooperation form Medicaid
- Required legislative action around public policy issues

10.4.3 Business Plan/Financial Risks

The following business plan risks were identified as potential barriers to building a successful HIE in Guam:

- Failure to follow the adopted Strategic and Operational Plan
- Inability of certain stakeholder groups (i. e. CAHs, Physicians, Long-term care) to contribute their equitable share of the costs

10.4.4 Legal Risks

The following legal risks were identified as potential barriers to building a successful HIE in Guam:

- Privacy and Security risk – Do not appear to be significant because both private providers and payers as well as territory government agencies that are expected to participate in the HIE comply with HIPAA.

10.4.5 Technical Risks

The following technical risks were identified as potential barriers to building a successful HIE in Guam:

- Additional unanticipated ONC requirements
- Additional unanticipated CMS requirements
- Maintaining pace with rapidly evolving technical specification and standards

10.4.6 National Risks

The following risks with the Medicare program were identified as potential barriers to building a successful HIE in Guam:

- Failure to participate with the health information exchange
- Failure to share equitably in the costs of providing health information exchange

10.4.7 NHIN Risks

The following risks associated with the Nationwide Health Information Network were identified as potential barriers to building a successful HIE in Guam:

- Achieving connectivity to Guam, American Samoa, Saipan and Hawaii
- Providers using NHIN Direct and assuming it will meet their Meaningful Use needs for all three stages

10.5 Revenue Models

The Finance Domain Team examined seven different revenue models as possible methods for funding the construction and operation of the Health Information Exchange.

10.5.1 Membership Fees

Application fee with monthly / annual fees depending on class of user (Hospital, Payer, Employer, etc.)

Pros	*Cons*
Easy to understand and administer	Fees don't reflect actual usage
Flexible structure	May charge a disproportional share to one stakeholder group
Fees based on specific criteria	

10.5.2 Usage Fees

Payments are based on actual usage of the exchange

Pros	*Cons*
Based on actual amount of information exchanged	May discourage usage by key stakeholders
Measures data volume	Difficult to track and bill
	Difficult to administer

10.5.3 Assessment Fees

Assessment fee charged on some characteristic such as number of beds, hospital discharges, and employees in health plan

Pros	*Cons*
Ensures all stakeholders contribute something to the operations	Fees don't reflect actual usage
Flexible	May charge a disproportional share to one group
May include a broader group of stakeholders	Annual audits may be necessary to reflect changes in chargeable characteristics

10.5.4 Cost Savings

Payments are based on the projected operational costs saved by each stakeholder gained from joining the HIE

Pros	*Cons*
Does not require new operational revenues to cover costs	Difficult to track and measure
Easier to sell to Boards of Directors	Difficult to identify real bottom line savings
	Realizing savings may require layoffs and this seldom occurs with smaller stakeholders

10.5.5 Taxation

A specific consumer tax levied by the legislature to cover the operational costs of the HIE

Pros	*Cons*
Reliable funding supported by a general tax levy	Difficult to gain approval of legislature
Includes most users of the healthcare system	Difficult to change after initial adoption

10.5.6 Grants

Support from various agencies and organizations in the form of an appropriation for a specific purpose

Pros	*Cons*
Many sources available and willing to support a good cause	Generally they are for a specific purpose and for a limited time frame
Better for capital expenditures than for operational costs	Usually requires many applications to secure a few grants

10.5.7 Fees for HIE Services

Fees for establishing various services (consumer services like PHR support, sponsorships, secondary uses of data, etc.) that stakeholders will pay for beyond the basic services of the HIE

Pros	*Cons*
Direct correlation between fees and services	Difficult to determine basic from added value services
Stakeholders only pay for the services they desire	May price some services outside the affordability of smaller stakeholders

10.5.8 Payment in Lieu of Taxes

Several healthcare providers in Guam are exempt from taxation. In addition to providing them with a competitive advantage, it decreases general fund resources. If those entities that are exempt from taxation were required to contribute an equal share to HIE expenses, it would serve as a way fund operations.

Pros	*Cons*
Equalizes healthcare operating expenses	Will require some legislative support and that may de difficult
Provides an immediate source of revenue	May be difficult administer and collect

10.6 Existing Financial Models in Other States

The Finance Domain Team researched financing models in other states. Many of the contacted entities were unwilling to share key financial data. However, the eHealth Initiative released their annual survey in July 2010 and it contains data that is useful in considering what other states are doing. They had 107 respondents included in their survey. The following charts present various revenue models for consideration. The numbers shown are the number of respondents (of the 107) in each year that indicated that the stated item applied and their operation

Table 4 – eHealth Initiative Survey Results

Sources of Start-up Funds (Number of respondents citing)	2009	2010
Hospitals	42	63
State government grants	43	57
Other Federal grants	39	50
Private payers	26	35
Physician practices	15	33
Philanthropic sources	19	25
Public payers (Medicaid/ Medicare)	12	14
Medical societies	11	11

Public Health	8	10

Ongoing Revenue Sources (Number of respondents citing)	2009	2010
Hospitals	26	43
Physician practices	16	32
Private payers	14	25
Laboratories	11	19
Other Federal grants	9	12
State Government Grants	10	11
Public payers (Medicaid/ Medicare)	5	10
Public Health	7	10

Funding Sources for Operations (Number of respondents citing)	2010
Subscription fees or membership dues to data providers	32
Subscription fees or membership dues to data users	30
One-time financial contribution	12
Transaction fees charged to data providers	11
Transaction fees charged to data users	9
Advertising or marketing	2
Utility model – Fees assessed through state for public service	1

10.7 Decisions and Recommendations

After careful consideration, GeHC recommends the following alternatives as feasible in some combination:

- Membership fees to providers and data users
- Fee for Service Revenues
- Payment in Lieu of Taxes
- Grants (capital expenditures but not on-going operations)
- Cost Savings / Cost Avoidance

10.8 Cost Savings / Cost Avoidance

Cost savings are frequently touted as a way to pay for HIE services. Many states have relied in the Center for Information Technology Leadership (CITL) study from 2004 to show potential cost savings related to redundant tests, workflow efficiencies, and e-Prescribing. While the study identifies ways the healthcare system can reduce costs, when field tested, these savings are not as easily obtained as indicated. When these costs do not materialize, the projected cost

savings and cost avoidance models do not provide reliable methods for paying for HIE services. Unfortunately, the analysis performed by CITL does not usually result in actual savings in the field. There are six primary reasons why these savings frequently do not materialize.

10.8.1 Quantification of Savings

It is extremely difficult to quantify any real cost savings for stakeholders. Stakeholders are not persuaded by various assumptions and it is difficult to convince stakeholders that they can realize any actual savings or avoid any real costs. Many stakeholders typically show serious resistance to using potential cost savings as a viable way to fund HIE.

10.8.2 Reduced Staffing Levels

Cost savings are built on the principle that costs can be lowered by reducing staffing levels. In many cases, this does not translate into real savings. Most providers are already short staffed. Any savings from EMR and HIE technology doesn't typically result in reduced staff but in more often in staff reassignments. Therefore, the savings are absorbed by other work and the provider does not actually see any reduced costs on the bottom line.

10.8.3 Higher Expense

In the event that organizations can reduce staff in some areas because of the positive effects of electronic health records (EHRs), the added costs of operating the electronic health record system can offset any reduced staff expenses. The difference is in the expenses associated with the personnel eliminated by reducing tests and the costs associated with staff skills required to operate the EHR. Frequently, the staff expense (salaries and benefits) associated with the skills of the personnel doing various tests is lower than the expenses for staff capable of operating the EHR. Therefore, reducing X number of lower cost staff can be offset by needing Y additional staff to work in a technology driven environment.

10.8.4 Liability

Liability laws also play in to the equation. We have had many physicians tell us that "until the liability laws change, I am ordering that extra test". Exploring changes to liability laws in Guam may be necessary to address this issue.

10.8.5 Trust

Trust is also a major issue. Many physicians will not accept the lab result, image or other test from someone they are not familiar with and trust. Receiving results from somewhere outside the known and trusted labs and imaging center is simply not deemed reliable enough for most physicians. Therefore, they tend to order the test repeated from a known and trusted source.

10.8.6 Lost Revenue

When a test is not performed, someone's bottom line suffers. While not commonly discussed openly, there is enough resistance from providers to know this is a real concern for many providers who administer various tests. Therefore, they tend to resist for a variety of reasons but lost revenue is often the real issue for many of them.

10.9 Cost Savings Opportunities

However, cost savings are possible but not in the amounts projected from the CITL study. It is reasonable to project savings of some amount from duplicative tests and to make projections in other areas where cost can be reduced. Listed below are three areas where savings can be quantified and realized in believable amounts.

10.9.1 Reduced Administrative Costs

There are many economic benefits to being involved with a Health Information Exchange/ Health Information Technology program. First, the cost is associated with interfacing with multiple hospitals, where each interface with each hospital ranges in cost of several thousand dollars. When using an HIE; only one interface is needed to interact with several hospitals, creating a reduction in the cost for multiple interfaces. Due to economies of scale, the HIE will be able to secure a lower cost for the one interface to also produce cost savings. And with just one interface, hospitals can cut IT costs associated with the maintenance and communication between multiple interfaces.

HIE can be used to reduce the cost of overhead. Currently a substantial amount of time is spent on administrative duties. A recent study in Illinois has shown that the efficiencies from using HIE have produced a mean savings of $112,000 annually per physician. When the benefits of an HIE are combined with paperless patient care, the cost savings increase immensely. Hospitals are no longer calling and requesting reports to be sent, waiting for reports and charts to print, or canceling appointments due to lack of intake information. Another benefit of the paperless patient care is the inflow of information to help reduce medical errors, thereby increasing the quality of patient care and decreasing the risk of malpractice lawsuits.

In addition to the time saved by operating paperless, the cost of printing documents per patient is saved as well. The Wisconsin Health Information Network uses a paper based system and has historically reported a cost of $5.10 per patient. The Indiana Health Information Exchange estimated that their reduced paper based system has a total cost of reports per patient of $0.81. Illinois has had even more impressive results, and is reporting a cost of $.041 per patient with their paperless system. Savings of about $4.00 to $4.50 per patient can result in a substantial annual savings.

10.9.2 Reduced Processing Costs

Health Information Technology will enhance the overall claims processing procedures. The latest electronic health record (technology vastly improves the ability of providers to submit “clean” claims. As this technology is more fully implemented across Guam, savings in the claims process can be allocated to help pay for the operation of the HIE.

In North Dakota, Blue Cross – Blue Shield (BC/BS) provides coverage for about 90% of the private payer market. Blue Cross Blue Shield conducted a study to determine the impact on claims processing costs resulting from higher quality claims submissions. They studied the claims submissions from the six major hospitals and discovered the following:

- A relatively significant difference between the hospitals was found in the number of claims successfully processed without administrative intervention. Overall, the number of claims processed successfully without administrative intervention for all

six hospital systems was 84%. However, the differences between the hospitals ranged from 67% to 86%.

- In has been calculated that for each percentage point increase in the overall claims processing success rate, BC/BS could save up to $315,000 annually in administrative costs.

Health information technology will improve the claims processing process. Health information exchange will also contribute to this improvement. Therefore, it is reasonable to assume that providers could save an equal or greater amount as they would need to spend in time gathering and resubmitting the requested patient data and information. In addition, similar or greater savings could be gained in the Medicaid process as well. When combined, the total savings within the Territory of Guam could approach $100,000 annually. With the annual operational cost of the HIE estimated to be under $500,000 annually, this potential reduction in operating costs is significant.

10.10 Fees for Services

It is clear from the previous section that Health Information Exchange in Guam cannot be funded solely from cost savings and / or cost avoidance. While some savings can be obtained by stakeholders, converting these savings into revenue for the HIE is difficult to accurately determine. Therefore, it is the conclusion of GEHC that revenue in the form of fees for services must be included in any financial sustainability plan.

10.10.1 Healthcare Informatics Consulting Services (Ingenix, 2010)

A recent Ingenix study reporting on their HIE Gateway Model for Long-Term sustainability described offering analytical services on a fee for service basis to providers, payers, governmental agencies and other stakeholders. In their model these value-added services included:

- Performance management
- Care gap identification
- Fraud and abuse identification and prevention
- Population monitoring and predictive profiling
- Care and disease management
- Clinical research

Each of these services can be used to fund the HIE by charging stakeholders for value-added services. Ingenix cites the Michigan case where using analytics saves their stakeholders $200 million annually. With these types of savings, stakeholders should be willing to pay a fee of 10% – 15% of the savings for the HIE consulting services. Using the annual Michigan savings as a guide for Guam and based on calculations incorporating the population differences between the states, the annual savings in Guam could approach $15,000,000. This converts into a consulting fee of between $1,000,000 and $1,500,000 annually.

10.10.2 Best Practices Consulting Services

A Guam study published in the Health Care Financial Management Association magazine in April 2004, North Guam Health Services, using care-based cost management (CBCM),

added $7,500,000 to the bottom line annually. If the HIE developed consulting services that stakeholders would use to achieve similar operational savings, they could charge 10% to 20% of the savings as fees. This has the potential in Guam to generate revenues in excess of $400,000 annually.

10.10.3 Quality Reporting Services

All stakeholders will be required to do quality reporting to CMS by 2015. Many smaller stakeholders may need the HIE to provide a way for them to satisfy this requirement. While it is too early to estimate demand or project potential revenue, it is important to include this as a potential revenue source for sustaining HIE operations.

10.10.4 Clearing House Services

Many HIE stakeholders use clearing house services to help consolidate and process insurance claims. Given the nature of the HIE operation, it is possible to perform similar services at the HIE for various stakeholders. While it is too early to estimate demand or project potential revenue, it is important to include this as a potential revenue source for sustaining HIE operations.

10.10.5 Web Portal Services

Consumers are projected to begin using technology to manage their healthcare within the next few years. It is estimated that Medicare patients for example use the services of approximately nine (9) different providers. Providing a web portal for patients to browse various provider services, collect personal health information from multiple sources to populate their Personal Health Record, and manage multiple providers with appointment scheduling, test results and other services, will be an excellent source of revenue for the HIE. While it is too early to estimate demand or project potential revenue, it is important to include this as a potential revenue source for sustaining HIE operations.

10.10.6 Sponsorships / Underwriting

When the HIE has a web portal service available and is connecting with patients across Guam, it can sell sponsorships and underwriting to various companies that would like to reach these same patients. While it is too early to estimate demand or project potential revenue, it is important to include this as a potential revenue source for sustaining HIE operations.

10.10.7 Secondary Uses of Redacted Data

It is widely assumed that various entities would have an interest in the data and information the HIE can access and collect. Given this potential service, the HIE can collect and de-identify data for secondary uses by interested entities who are willing to pay for the data. While it is too early to estimate demand or project potential revenue, it is important to include this as a potential revenue source for sustaining HIE operations.

10.11 Sample Revenue Model

Using the e-Health Initiative survey data as described in Section 3 above, it is possible to model various scenarios of how the HIE costs could be distributed to stakeholders. The potential model presented for consideration below is based on the following assumptions:

- Assumption 1 – HIE services are as yet undetermined

- Assumption 2 – A pro-forma expense budget is to be created after the services are more precisely defined
- Assumption 3 – It is assumed for this exercise that the annual operating budget for the fully functional HIE is $10,000,000. The actual cost will be determined after the services are clearly defined
- Assumption 4 – The primary private sector payers are Select Care, Stay Well, Net Care, and, FHP – Take Care
- Assumption 5 – Guam Memorial Hospital will participate and pay a fair share of the costs:
- Assumption 6 – Territory agencies include the Departments of Public Health and Huiman services and Corrections
- Assumption 7 – Services for which fees can be charged but are not yet determined
- Assumption 8 – Cost savings / avoidance will need to be determined and actual dollar values assigned after the Strategic and Operational Plan is approved
- Assumption 9 – As much as feasible, all stakeholders make some contribution to offset the operating charges
- Assumption 10 – Physicians will be willing to pay $50 per month for HIE services
- Assumption 11 – Startup capital funding is obtained from the ONC grant
- Assumption 12 – Operational funding for the first three years is secured from the larger stakeholders in a manner to be determined

Revenue for funding GeHC will be generated according to the following formula:

Table 2 – Revenue Formula

	2011	2012	2013	2014	2015	2016
Territory Legislative Appropriation	5%	5%	5%	5%	5%	5%
Fees in Lieu of Taxation	5%	5%	5%	5%	5%	5%
Provider Fees (To be determined)	75%	75%	70%	65%	65%	55%
State Medicaid	15%	15%	15%	15%	15%	15%
Fees for HIE Services	0%	0%	5%	10%	15%	20%

10.12 Finance Health Information Exchange Strategies

In consideration of the previous discussion in section 10, the GeHC Board has identified the following strategies for moving forward.

10.12.1 Benefits Distribution

The following strategies for determining the distribution of benefits related to HIE were identified by GeHC :

- Gather and analyze real operational data from various stakeholders (Hospitals, Medicaid, Private payers in Guam, etc.) to determine the actual benefits accruing to stakeholder groups
- Use the actual data to create an equitable financial model to pay for HIE services
- Determine an equitable and fair membership fee that factors in any real cost savings / avoidance

10.12.2 Financial Model

The following strategies for analyzing the actual benefits that each stakeholder may potentially receive from participation in the HIE were established:

- Build sustainability into the model from the beginning and separate start-up from ongoing operations
- Revenue structure needs to be simple, easy to understand, and equitable
- Incentivize early adopters to join and support the HIE (expense to join the state HIE is economically high for independent providers)
- Create a strong marketing plan and strategy to sell and market the HIE
- Use the data from a critical mass of providers for creating business-to-business revenue and/or cost saving opportunities
- Incentivize providers to join existing ecosystems

10.12.3 Seeking Outside Funding

The following strategies were created to secure outside funding to help pay for GeHC including:

- Solicit hospital, corporations and private foundations for sponsorship funding
- Hire a development person
- Grants should not be utilized for operating funds but for capital purchases

10.12.4 Building GeHC in Four Phases

Strategies for building the HIE were identified:

- Pre-Start-up Phase (9 months) – Activities during the planning work include:
  - Build off the natural flow of information exchange and limit the exceptions
  - Use incentives to encourage physicians to join early
  - Writing and obtaining agreement on various legal documents
  - Creating the financial sustainability model
  - Developing of Business and Technical Operations policies and procedures
- Initial Start-up Phase (18months) – Activities associated with the building of the HIE include:
  - Project management
  - Purchasing various components
  - Connecting the major ecosystems and testing data exchange
  - Beginning the marketing program
  - Provider adoption
- Ramp up to critical mass Phase (12-18months) – Moving from start up to achieving break-even and beyond
  - Marketing GEHC to providers - Sell on enhancing the patient experience
  - Connecting providers across the state
  - Identifying and creating GeHC services

    - Establishing a steady revenue stream
    - Finalizing Business and Technical Operation policies and procedures
- Steady State Phase (48 month level) – Fully self sustainable and growing
    - Achieving sustainability
    - Reaching critical mass
    - Launching new services to assist providers achieve Meaningful Use and report on quality measures

10.12.5 State Agencies

The following strategies for including various state agencies in the GEHC were established:

- Determine value proposition for all state agencies and ensure they are connected to the HIE
- Integrate all of the public health registries into the HIE
- All state agencies, when issuing RFPs related to Health Care and/or HIE services, should require responders be a stakeholders in the HIE in order to be eligible to bid on state related projects.
- Work with Medicaid and integrate with the SMHP process

10.12.6 Additional Revenue Opportunities

The following revenue opportunities, as described in Section10.10 above, should be studied and analyzed as potential sources of additional operational funding:

- Healthcare Informatics Consulting
- Best Practices Consulting
- Quality Reporting
- Clearing House Services
- Web Portal Services
- Corporate Sponsorships/Underwriting
- Secondary uses of data
- Group purchasing services
- Decision Support Services
- Disease Management
- EMR light

11.0 Technical Infrastructure

The Department of Health and Human Services and the Office of the National Coordinator for Health Information Technology and Centers for Medicare and Medicaid Services have recently released the Meaning Use (MU) final rule specifying the related initial set of standards, implementation specifications, and certification criteria for electronic health record technology with final Meaningful Use Stage 1 objectives and measures. This document fully recognizes the final rules for Meaningful Use Stage 1 along with objectives and measures. The technical infrastructure described in this Section reflects Meaningful Use objectives and adopted standards, implementation specifications, and certification criteria in the design of the HIE architecture. Appendix A contains a table of summaries of final rule for Meaningful Use Certification Criteria for Health Information Technology released by CMS and ONC. The last column of the table, "HIE Stage 1" indicates a set of standards/implementation specifications recommended for content exchange, vocabulary, and security/privacy to be adopted for the first stage (Stage 1) of the Health Information Exchange implementation as well a set of capabilities to be offered at the Stage 1 of the HIE implementations. The following list identifies as a minimum set of services to be offered during Stage 1 aligned with general and ambulatory/inpatient specific capabilities as specified in the Meaningful Use final rule.

- Electronic Prescribing Service: Electronic generation and transmission of prescriptions and prescription related information
- Laboratory Results Exchange Service: Electronic submission of laboratory test orders and receiving/displaying of laboratory test results
- Exchange of Patient Summary Record in the format of HL7 CDA Release 2, Continuity of Care Document (CCD)[3] with following minimum data elements:
- Demographics
- Problem list
- Medication & Medication Allergy List
- Laboratory test results
- Procedures

The following sections describe standards and implementation specifications adopted for Meaningful Use.

11.1 Adopted Standards for Meaningful Use

Table 3 - Category for Standards to support Meaningful Use

Category	Description
Vocabulary Standards	Standardized nomenclatures and code sets used to describe clinical information such as problems and procedures, medications, and allergies etc
Content Exchange Standards	Standards used to share clinical contents between healthcare stakeholders: patient record summaries,

[3] HITSP/C32 "Summary Documents Using HL7 CCD Component" as an implementation specification to be adopted

	prescriptions, structured clinical documents, and administrative transactions
Transport Standards	Standards used to establish a common, predictable, secure communication channel for exchange of clinical contents between health information systems.
Privacy and Security Standards	Standards related security and privacy: Authentication, Authorization, Access Control, and Auditing

11.1.1 Vocabulary Standards

Table 4 – Vocabulary Standards

The HIE should adhere to semantic interoperability and standards for coding systems

Purpose		Meaningful Use Stage 1	Meaningful Use Stage 2
Electronic Prescribing		National Library of Medicine's RxNorm	RxNorm
Patient Summary Record	Medication Allergy List	No Standard	Unique Ingredient Identifier (UNII)
	Medication List	National Library of Medicine's RxNorm	RxNorm
	Problem List	ICD-9-CM or SNOMED-CT	ICD-10-CM or SNOMED CT
	Procedures	45 CFR 162.1002 (a)(2) and (a)(5)	
	Lab Order and Results	LOINC	LOINC
Lab Results Reporting to Public Health		LOINC	LOINIC, UCUM, SNOMED-CT
Surveillance Reporting to Public Health		HL7 2.3.1 or HL7 2.5.1	GIPSE
Submission to Immunization Registries		CVX	CVX

11.1.2 Content Exchange Standards

Table 5 – Content Exchange Standards

Purpose	Meaningful Use Stage 1	Meaningful Use Stage 2
Electronic Prescribing	NCPDP SCRIPT 8.1 or SCRIPT 10.6	NCPDP SCRIPT 10.6
Drug Formulary Check	NCPDP Formulary and Benefits Standards 1.0	NCPDP Formulary and Benefits Standards 1.0
Patient Summary Record	HL7 CDA R2 CCD Level 2 (HITSP C32) or ASTM	TBD

	CCR	
Administrative Transactions	HIPAA Transaction Standards ASC X12N or NCPDP	HIPAA Transaction Standards ASC X12N or NCPDP ASC X12N 270/271 ASX X12N 837 (Dental, Professional, and Institutional) Other transactions
Quality Reporting	CMS PQRI	CMS PQRI
Lab Results reporting to Public Health	HL7 2.5.1	TBD
Surveillance Reporting to Public Health	HL7 2.3.1 or 2.5.1	TBD
Submission to Immunization Registries	HL7 2.3.1 or 2.5.1	TBD

11.1.3 Transport Standards

Simple Object Access Protocol (SOAP)
Representational State Transfer (REST)
HTTP
extensible Markup Language (XML)

11.1.4 Privacy and Security Standards

Table 6 – Privacy and Security Standards

Purpose	Adopted Standards
General Encryption and Description of Electronic Health Record	FIPS 197 Advanced Encryption Standard (AES)
Encryption/Decryption of Electronic Health Information for Exchange	Secure communication channel – TLS, IPv6, IPv4 with IPsec
Audit Logging	Minimum data elements: date, time, patient ID, user ID
Data Integrity	SHA-1 or higher hashing algorithm FIPS PUB Secure Hash Standard (FIPS PUB 180-3)
Cross Enterprise Authentication	IHE Cross Enterprise User Assertion (XUA) with SAML
Record Treatment, Payment, and Healthcare operations disclosures	Minimum data elements: date, time, patient ID, user ID, and a description of the disclosure

11.2 Data Architecture

The following diagram shows a high-level system architecture and its four core component architecture including 1) business and application architecture, 2) data architecture, 3) technical architecture: Inter-HIE and Intra-HIE and 4) Privacy and Security Architecture. These four core component architectures are loosely coupled and interact with each other to realize a healthcare ecosystem. Desired system features (such as interoperability, scalability, efficiency and cost

effectiveness, and quality of service) can be realized with coordination of four architecture components.

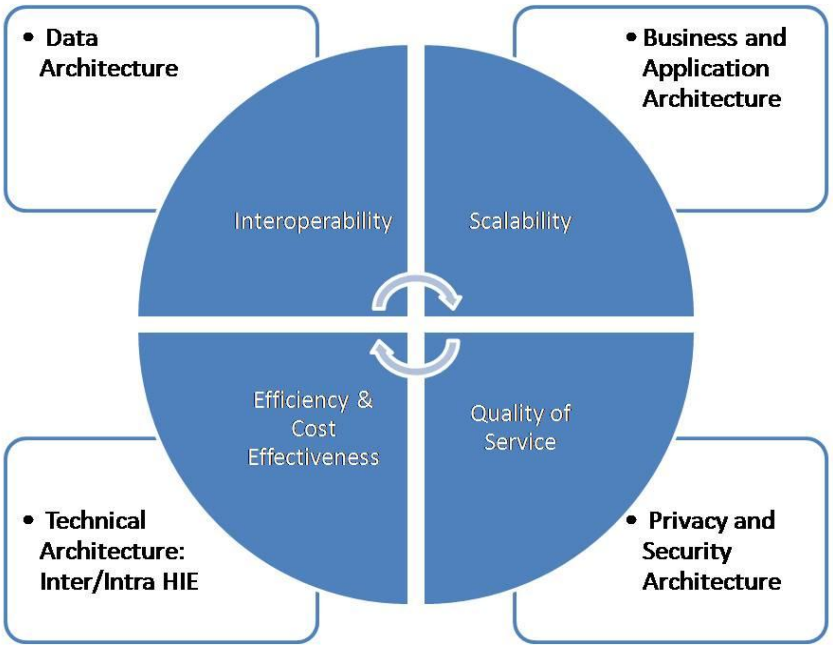


Figure 4 - High-Level Architecture for Healthcare Ecosystem

11.2.1 Business and Application Architecture

Business and Application Architecture should include a Core Service stack comprising core components and subsystems supporting three core functionalities for health information exchange: 1) Privacy and Security, 2) Patient Discovery, and 3) Administrative/Clinical Data Exchange. This core service stack should be integrated with various health information systems via standardized Application Programming Interfaces (APIs) and adapters. On top of the Core Service stack, services implementing business workflows (use cases) and applications are deployed via adapters. Each service on this stack supports a specific business workflow with trading partners such as providers, HIEs, Federal/State agencies, payers, and research communities.

11.2.2 Data Architecture

Data Architecture should address syntactic and semantic interoperability (Content Exchange and Vocabulary Standards) for health information exchange by including but not limited to 1) vocabulary mapping engine, 2) data conversion/transformation, data consolidation, and 3) support of both structure and unstructured data

- Structured Data - structured with an abstract data model (e.g., HL7 CDA)
- Unstructured Data - usually computerized information without a data model (or with a data model that is not easily usable by a computer program)

11.2.3 Technical Architecture

Technical Architecture provides core functionalities supporting business use cases/workflows, and services. It includes components for establishing a common,

predictable, secure communication between health information systems. It should supports 1) Interstate-HIE and 2) Intrastate-HIE.

11.2.4 Privacy and Security Architecture

Privacy and Security Architecture needs to include components for:

- Authentication
- Authorization
- Access Control
- Auditing

11.3 Technical Considerations

The table below shows a list of criteria to be considered when designing a HIE Architecture. This list comes from combination of general practice for system architecture design and the result of the State's Environment Scan conducted in April.

Table 7 – Technical Considerations

Criteria	Description
Flexibility	The architecture and system components should be easy to modify for integration with other applications, software components, and environments. For flexibility, the following should be taken into consideration when designing the HIE architecture Flexible Programming: Language Independent + Platform Independent Architectural Styles: Support various architectural design: for example, peer-to-peer, distributed and centralized Reusable components with minimum modification
Interoperability & Interoperable Standards	The architecture and system components should be designed to assure syntactic and semantic interoperability for the exchange of health information. The proposed HIE architecture should be designed by Adopting existing and evolving standards addressing interoperability for health information exchange Adopting HIT and standards adopted and/or recommended by HHS/ONC/FHA Vocabulary Standards Content Exchange Standards Transport Standards Privacy and Security Standards
Scalability	The architecture should be designed to scale up (rescaling in size and volume) as HIE grows with more stakeholders, additional connectivity, rapidly growing transaction/data volumes, and newly added services supporting business use cases and workflows.
Privacy and Security	The architecture should ensure protection of patients' privacy and the security of the information exchanged between stakeholders. This

	requires the following Coordination with HIPAA Coordination with HITECH Act Coordination with DURSA (HHS/ONC/NHIN)
Liability	The architecture should ensure the local ownership of medical data and information.
Cost Effective	The architecture must be designed for HIE sustainability.
Other Quality of Service (QoS) Metrics	The architecture should also be designed considering other QoS elements including but not limited to Performance Availability Ease of Use: The architecture must be designed in way that is easy to use, seamless, and have the same functionality and appearance to stakeholders
Business Use Case and Workflows	The architecture should ensure offerings of business use cases and workflows along with services for the stakeholders including but not limited to HIE to HIE including state's report to Federal Public Health Provider to Patient Provider to Provider Provider to Laboratory Provider to Pharmacy Provider to Federal/State Public Health

11.4 Architectural Choices Overview

There are generally three architectures that are supported for Health Information Exchange, or HIE, including Federated, Centralized, and Hybrid Architectures. The State of Guam will ensure that any and all vendor systems adhere to national standards (FHA, ONC, NHIN, HHS, etc) and to ensure interoperability and support from the community.

11.4.1 Federated Architecture

A Federated Architecture is a distributed architecture for HIE where the patient data remains at the provider level, and this patient data is not duplicated in a HIE central repository or database. In a Federated HIE model, there is no centralized database or centralized repository, thus allowing the Federated model to have a high security model (i.e., all patient data remains at each individual provider location, typically behind the provider's firewall and protected by existing provider security and systems, etc.). Patient data is queried and retrieved from each source system in a Federated Model for HIE, and the returned information is assembled and presented to the person or system querying for information.

11.4.2 Centralized Architecture

A Centralized Architecture for HIE is one that has a centralized database, allowing all HIE members to access and utilize core services and data, including patient data. In a Centralized Model, the HIE is the data center and patient repository, and all patient data is synchronized from provider systems to the centralized database and 'router'. In this model, the HIE is fully responsible for privacy and security, as well as access controls to the patient data in the HIE, which can present some operational, legal and security hurdles that must be overcome.

11.4.3 Hybrid Architecture

A Hybrid Architecture for HIE is one that utilizes the best of both the Federated and Centralized Architecture. The HIE, in a Hybrid Architecture model, acts as a clinical information coordinator, and responsibility for patient information and security is shared amongst the HIE participating members. It is important to note that patient data in a Hybrid Architecture stays on the source, or provider, systems and is staged on dedicated databases within the HIE. The Territory of Guam has selected a hybrid model to be used for the state HIE.

11.5 Nationwide Health Information Network Overview

An important aspect of HIE interoperability and Meaningful Use is the ability to connect with the Nationwide Health Information Network (NHIN) and be in full compliance with current and developing standards from Health and Human Services, the Office of the National Coordinator (ONC) and the Federal Health Architecture (FHA). Installation and utilization of a certified and compliant NHIN Gateway, as well as standards-compliant systems and solutions, will ensure that the Territory of Guam HIE can link with other NHIN HIEs, states, and Federal Agencies. Interoperability with other State, Territory and Federal networks, as well as other HIEs, will support the Territory of Guam HIE in meeting the criteria for Meaningful Use.

11.5.1 Nationwide Health Information Network (NHIN)

The Nationwide Health Information Network comprises standards, services, and a trust fabric that enables the secure exchange of health information over the Internet. This critical part of the national health IT agenda will enable health information to follow the consumer, be available for clinical decision making, and support appropriate use of healthcare information beyond direct patient care, so as to improve population health.

To support providers wishing to achieve Meaningful Use of electronic health records and qualify for incentives under the HITECH Act, technical and policy activities over the course of 2010 will expand the value of NHIN standards, services and trust fabric as well as extend the ability to securely exchange health information to a larger audience.

One instance of the NHIN standards, services and trust fabric has been in pilot testing through the NHIN cooperative, and is now ready for a limited production pilot to a broader community. This instance of the NHIN includes the robust technology and trust fabric necessary to support health information exchange among large nationwide organizations and federal entities. Entities that wish to exchange information with these partners must:

- Execute a comprehensive trust agreement called the Data Use and Reciprocal Support Agreement (DURSA) that governs the roles and responsibilities of exchange at this level.
- Demonstrate that they can support a multi-point information exchange, and
- Complete a validation and on-boarding process.
- The Office of the National Coordinator for Health IT (ONC) believes the secure exchange of health information using NHIN standards, services and policies, with broad implementation, will help improve the quality and efficiency of healthcare for all Americans.[4]

11.5.2 Integration with and Participation on the Nationwide Health Information Network:

As listed above, to participate in the Nationwide Health Information Network, the Territory of Guam must execute the DURSA agreement, demonstrate a multi-point information exchange, and complete a validation and on-boarding process. It is also of note that the Guam *might* require a Federal Agency sponsor to participate on the NHIN (note: rules and regulations on connectivity to NHIN, as well as requirements such as having an executive sponsor or Federal Sponsoring Agency are fluid and changing, thus this requirement may need further modification), therefore, the GeHC will present a NHIN use case and connectivity model to a Federal Agency as part of the Phase I implementation of GeHC. By utilizing a Federal Agency use-case and sponsor, GeHC can insure participation and compliancy with the NHIN at a Federal level, and thus utilize NHIN to connect to other territorial and state HIE initiatives.

It is recognized that territories and initiatives surrounding the Guam have plans or are implementing NHIN connectivity for both intra- and inter-territory/state connectivity. It is therefore recommended that the Territory of Guam implement a NHIN Gateway for standards based inter- and intra-state connectivity, with the first use case to a Federal Agency. Additional NHIN connectivity to other territories and states can be added in a phased approach, including connectivity to American Samoa, Saipan, Republic of the Marshall Islands, Hawaii, and the US Mainland. The Philippines and other Asian countries can be added in additional phases, including the addition of more Federal Agencies and Federal use cases.

11.5.3 Open Source NHIN CONNECT Gateway

GeHC will implement a standard CONNECT NHIN Gateway, as offered by the CONNECT Team of the Office of the National Coordinator (connectopensource.org). As CONNECT is the fully NHIN tested and compliant offering from the ONC and United States Government, the Territory of Guam can insure fully compliancy and interoperability with NHIN by utilizing a NHIN Gateway based upon CONNECT standards.

CONNECT is an open source software solution that supports health information exchange – both locally and at the national level. CONNECT uses Nationwide Health Information

[4] Overview of the Nationwide Health Information Network by The Office of The National Coordinator (ONC)

Network (NHIN) standards and governance to make sure that health information exchanges are compatible with other exchanges being set up throughout the country.

This software solution was initially developed by federal agencies to support their health-related missions, but it is now available to all organizations and can be used to help set up health information exchanges and share data using nationally-recognized interoperability standards.

CONNECT can be used to:

- Set up a health information exchange within an organization
- Tie a health information exchange into a regional network of health information exchanges
- Tie a health information exchange into the NHIN

By advancing the adoption of interoperable health IT systems and health information exchanges, the country will better be able to achieve the goal of making sure all citizens have electronic health records by 2014. Health data will be able to follow a patient across the street or across the world.[5]

As the CONNECT NHIN software is updated quarterly by the ONC and CONNECT Team, it is further recommended that the Territory of Guam will implement an NHIN Gateway either:

As a managed service from a CONNECT certified vendor, with full quarterly upgrades and compliancy insured or
Budget and staff internally for GeHC to insure the NHIN Gateway, based upon CONNECT standards, is upgraded, patched, and supported quarterly to insure full compliancy and interoperability with NHIN.

11.5.4 Aligned with NHIN Direct Efforts

NHIN Direct is another initiative lead by ONC addressing use cases such as on provider-to-provider, provider-to-pharmacy, and/or provider-to-laboratory. The HIE architecture for the Territory of Guam should consider future inclusion of the outcome of this efforts.

"NHIN Direct is the set of standards, policies and services that enable simple, secure transport of health information between authorized care providers. NHIN Direct enables standards-based health information exchange in support of core Stage 1 Meaningful Use measures, including communication of summary care records, referrals, discharge summaries and other clinical documents in support of continuity of care and medication reconciliation, and communication of laboratory results to providers".[6]

11.6 Proposed Technologies for Health Information Architecture

The following technologies will serve as a foundation for building GeHC.

- Service Oriented Architecture (SOA)
  - SOA is desired as a foundation of the HIE architecture. One of important of

[5] From http://www.connectopensource.org

[6] From http://www.nhindirect.org

aspect of SOA is the separation of the service from its implementation.

- Federated Identity Management along with Single Sign On and Role Based Access Control (RBAC)
- Cloud Computing technology along with Virtualization technology
- Infrastructure as a Service (IaaS)
- Platform as a Service (Paas)
- Software as a Service (Saas)
- Hybrid HIE Architecture – Combination of centralized and federated architectures
- Adoption of Open Source solutions with on-going development and support
- Syntactic and Semantic Interoperability
- Adoption of Enterprise Service Bus pattern for integration of heterogeneous health information systems
- SaaS (Software as a Service) based service offerings

In the table below, the technology is shown and compared to nine (9) different criteria for usability.

Table 8 – Usability Criteria

	Proposed Technology						
		Federated Identity Management	Cloud Computing/ Virtualization	Hybrid Architecture	Adoption of Open Source Solutions	Adoption of Standards	
Flexibility			√	√	√	√	
Scalability		√	√	√		√	
Interoperability		√				√	
Privacy & Security		√		√		√	
Liability				√			
Cost Saving			√		√		
Performance			√				
Availability			√				
Ease of Use			√				

11.7 Core Functionality

Following table shows a description on core functionalities, business needs, challenges, and recommendations.

Table 9 – Core Functionality

Core Functionality	Business Needs	Challenges	Strategies
Privacy and Security	HIPAA compliant system to ensure security and protecting patient privacy	• Disparate governance rules and policies on security and privacy in different healthcare organizations • Different authentication mechanisms Locality of identities ➔ Not globally sharable	• Public Key Infrastructure (PKI) based strong Authentication, Authorization, Access Control, and Auditing (4A) • Federated Identity Management ○ Simplified authorization/ registration process to multiple services across healthcare organizations ○ Single Sign On ○ Integrated Patient Health Information Protection • Role Based Access Control (RBAC) • Patient Consent Management System
Patient Discovery	"*Identifying A Patient*": Locating a patient and establishing the identity of mutual patients in different healthcare domains	• A lack of National Patient ID • Inconsistent demographic attributes among healthcare providers (or HIEs) and their data sources • Disparate and disconnected MPIs and independent matching algorithms • Consumer privacy restrictions	• Within a HIE (Intra-HIE Clinical Information Exchange): Distributed/Federated Patient Lookup • Across HIEs (Inter-HIE Clinical Information Exchange): Adopting NHIN Service Interface "Patient Discovery"
Administrative/ Clinical Data Exchange	"*Exchanging Clinical Information Securely*": Exchanging	• Establishing co-relation between patient IDs from different healthcare stakeholders ➔	• Within a HIE (Intra-HIE Clinical Information Exchange): Enterprise Service Bus (ESB) strategy to support various

	clinical data between different healthcare stakeholders	*Addressed by Patient Discovery* • Disparate and disconnected EHR systems using different communication protocols and data formats	communication protocols (transport protocols) and disparate data formats (data transformation/conversion) • Across HIEs (Inter-HIE Clinical Information Exchange): Adopting NHIN Service Interfaces "Query for Documents" & "Retrieve Documents"

11.8 Privacy and Security

The Territory of Guam should ensure all systems and services are fully compliant with all HIPAA regulations, and utilize standards based security mechanisms, including standardized encryption technologies. Industry-proven technologies such as Federated Identity Management with Role Based Access Controls should be considered for adoption to ensure data security and integrity. A high level of encryption, including Public Key Infrastructure (PKI) should be considered as an encryption standard, as well as the process of encrypting each and every message, regardless of location of the system (including within the HIE system). The utilization of standards based encryption technologies such as PKI will ensure authenticity and non-repudiation of data by digitally signing each and every message.

Utilization of a Federated Identity Management Service, along with Role-Based Access Control (RBAC) framework, information and data is available to be shared across wide area security domains. Additionally, any and all security processes and systems will comply with any and all local, state and Federal laws.

Integration of HIE services with a Federated Identity Management System, with Public Key Infrastructure and Role-Based Access Control, allows for interoperable clinical data exchange globally, with management retained locally.

11.8.1 Patient Consent Management

It is critical for GeHC to have a Patient Consent Management system integrated into the HIE infrastructure. The ability for a patient to electronically, or via paper, opt-out of the HIE will be included in the HIE infrastructure.

11.8.2 Enterprise/Master Patient Index

In order to support Inter-HIE patient discovery, GeHC plans to implement an Enterprise Master Patient Index (eMPI), as a part of the core offering of the Health Information Exchange. If implemented, the eMPI will be fully integrated with the HIE offerings and systems, to allow for HIE-wide patient matching. For example, the eMPI should fully interact with the Record Locator Service to establish the mutual identity between patients from the local HIE, as well as other HIEs. The risks of not implementing an eMPI include having multiple records and patient data for the same patient that are not matched and utilized / coordinated for care.

11.8.3 Clinical Data Exchange

The Territory of Guam could provide HIPAA-compliant clinical data exchange in both standard data formats, including CCR (Continuity of Care Record) and CCD (Continuity of Care Document). CCD has been selected as the standard for the Federal Health Architecture and NHIN. The Territory of Guam plans to implement the CCD standard for clinical data input and output and clinical data exchange. GeHC is aware many providers who have EHR technology and are not capable of CCD compliancy and the costs can be somewhat prohibitive to implement full CCD compliancy especially for smaller providers and healthcare entities. Providers who are incapable of exporting and importing CCD documents from their EMR systems will either need to upgrade their EMR systems to allow for full CCD interoperability, or implement a custom translator service/interface for CCD compliancy.

11.8.4 Record Locator Service

Modern patient care techniques and services demand instant access to a patient's disparate healthcare information. Instant access is realized with a system that accurately identifies all related information for an individual automatically, without human intervention. In general, a "Record Locator Service", or RLS, can be defined as an electronic index of patient identifying information. This RLS information directs providers to the location of the patient health records (usually held by healthcare organizations). Typically, the two core capabilities of an RLS are:

- Identifying a patient within a community (HIE or RHIO) and/or in a remote communities and
- Identifying the location (communities and/or healthcare provider facilities) of a patient's clinical data.

Users search for a patient with full or partial demographic information including first name, last name, date of birth, gender and zip code, and other search criteria.

11.9 Proposed Health Information Exchange Architecture

The proposed HIE Architecture for the Territory of Guam is a standards-based hybrid architecture with: 1) combination of centralized and distributed (federated) registries/ services/applications and 2) centralized and de-centralized data.

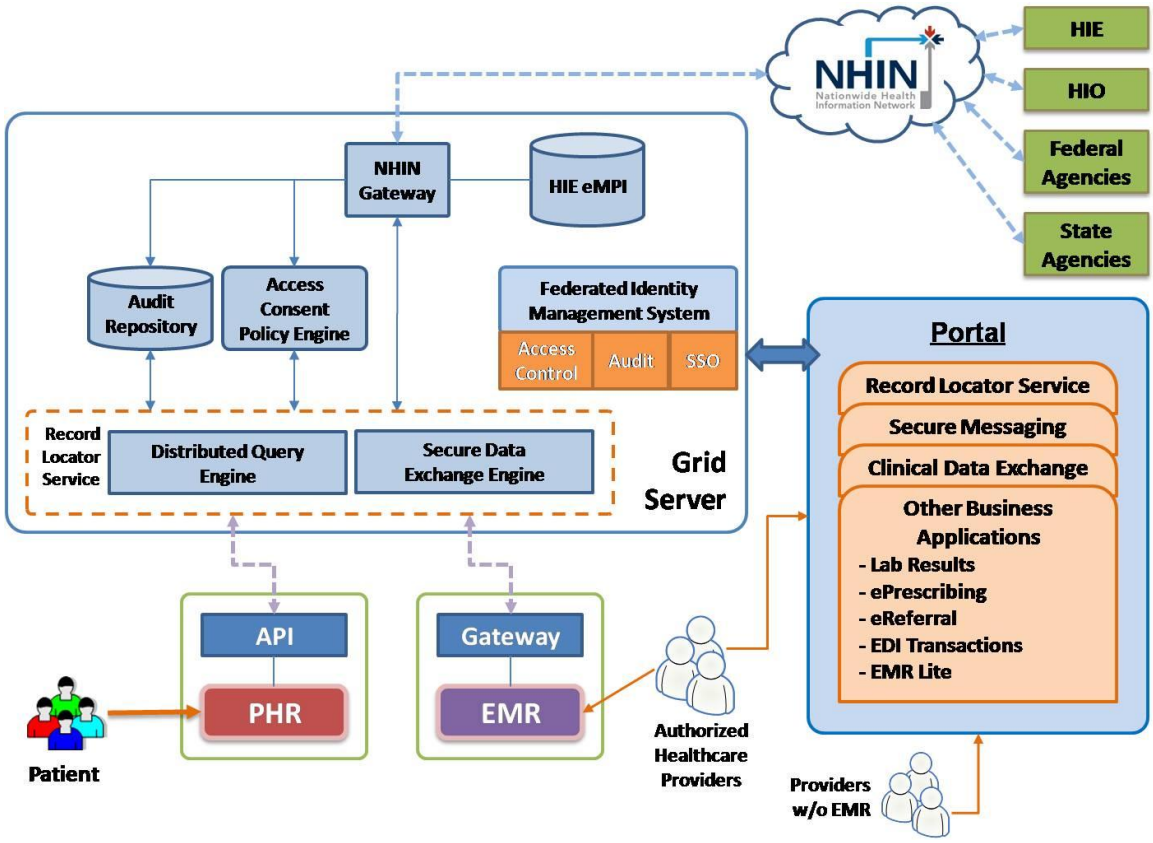


Figure 5 – Proposed Architecture

11.10 Development of Nationwide Health Information Network (NHIN) Gateway

11.10.1 NHIN Core Service Interface Specification and Profiles[7]

The table below describes a list of NHIN Core Service Interfaces and profiles. The HIE's NHIN Gateway implementation should fully implement NHIN Core Service Interface Specifications and may implement/support profiles optionally. Even though most of profiles are flagged as "optional", some of profiles need to be implemented and supported by GeHC to connect some federal agencies on various projects.

Table 10 – Core Service Interface

Category	Name	Description	HIE Implement ation: Options
Core Service Interface Specification	Patient Discovery	This interface defines the mechanism by which one NHIN Node can query another to determine if it is a source of information for a	Required

[7] NHIN Exchange http://healthit.hhs.gov/

		specific patient. This query is intended to be directed to the most likely source nodes, as opposed to broadcast across the NHIN	
	Query for Documents	A query from one NHIN Node to another, requesting a list of available patient specific documents meeting query parameters for later retrieval	Required
	Retrieve Documents	This interface defines an information exchange service which allows an initiating NHIN Node to retrieve one or more documents for a specific patient from a responding NHIN Node. The service requires the initiating node's use of the responding node Document IDs to specify the documents requested. Those Document IDs are presumably (but not necessarily), obtained by a prior Query for Documents	Required
	Document Submission	This interface defines an information exchange service which allows an initiating NHIN Node to send one or more documents for a given patient to a receiving node. Unlike Query/Retrieve and Pub/Sub, Document Submission does not require a prior request to retrieve a document or to subscribe to content and is categorized as a "push" transaction	Required
	Access Consent Policy	This specification provides a standard language, XCAML, for expressing restrictions on access to health information. These restrictions are also known as Access Consent Policies (ACPs)	Required
	Authorization Framework	This specification defines the exchange of metadata used to characterize the initiator of an NHIN request so that it may be evaluated by responding NHIOs in local authorization decisions. Along with the Messaging Platform, this specification forms the NHIN's messaging, security, and privacy foundation. It employs SAML 2.0 assertions	Required
	Messaging Platform	This specification describes the common web service protocols that must underlie every message transmitted between NHIOs. This specification represents a common messaging and security platform for all other NHIN core	Required

		service interfaces. The Messaging Platform describes the transport rather than the interface specifications as Messaging Platform consists of the underlying common elements of message transport rather than individual programming interfaces that can be invoked as web services. Along with the Authorization framework, this specification forms the NHIN's messaging, security, and privacy foundation	
	Health Information Event Messaging (HIEM)	This specification defines an information exchange service which allows NHIOs to request to subscribe or unsubscribe to various classes of content and events, and to notify NHIOs when content or events matching a subscription have been created or modified. Any NHIO seeking to utilize the pub/sub exchange pattern must utilize the HIEM service and apply the relevant HIEM Profile	Required
	Web Services Registry	This specification describes how NHIN participating HIOs to locate and utilize the appropriate NHIN web services offered by other members in a controlled, secure manner	Required
	Audit logging	Each service interface specification requires a set of audit events which should be generated and logged into an audit record repository at the HIE level. IHE ATNA profile is adopted for the format.	Required
Profiles	Continuity Assessment Record and Evaluation (CARE) Profile	The objective of the CARE data exchange is to improve the quality of care experienced by patients as they transition among health care providers.	Optional
	Geocoded Interoperable Population Summary Exchange (GIPSE) Profile	The GIPSE Profile supports the implementation of near real-time, nationwide public health event monitoring to support early detection, situational awareness and rapid response management across care delivery, public health, and other authorized government agencies	Optional
	Administrative Distribution Profile	This profile is intended to provide a mechanism for NHIOs to exchange non-patient specific data using a "push"	Optional

		mechanism	
	Physician Quality Reporting Initiative (PQRI) Profile	The PQRI program's primary purpose is to enable program participants to monitor their participation and clinical performance data as well as obtain information concerning the incentive payments they have earned. CMS is facilitating this endeavor through the collection of information about the outcome of services rendered that have had claims and clinical quality data codes populated by the Provider. These codes are then used to compute analytical statistics (i.e. ratios) for Provider Feedback reports.	Optional
	CMS Medicaid Member Eligibility Verification Profile	This document presents the NHIN Medicaid Eligibility Verification Web Service Interface Specification. This service will allow health care providers and other authorized users to determine the enrollment status of an individual patient in any of the 54 different Medicaid systems operated by US states and territories using a real-time request/response service across the NHIN	Optional – Emergence Pilot Profile
	CMS Electronic Submission of Medical Documentation (esMD) Profile	This profile specifies mechanisms supporting the submission of documentation by providers such as physicians and hospitals to a limited number of Medicare Review Contractors	Optional – under development

11.10.2 Leveraging the Open Source CONNECT NHIN Gateway

GeHC will implement an open source standard CONNECT NHIN Gateway, as offered by the CONNECT Team of the Office of the National Coordinator (connectopensource.org). As CONNECT is the fully NHIN tested and compliant offering from the ONC and United States Government, the Territory of Guam can insure fully compliancy and interoperability with NHIN by utilizing a NHIN Gateway based upon CONNECT standards. By leveraging CONNECT NHIN Gateway, the GEHC can be aligned with NHIN technology and reduce costs for development and on-going maintenance of NHIN Gateway.

CONNECT is an open source software solution that supports health information exchange – both locally and at the national level. CONNECT uses Nationwide Health Information Network (NHIN) standards and governance to make sure that health information exchanges are compatible with other exchanges being set up throughout the country.

This software solution was initially developed by federal agencies to support their health-related missions, but it is now available to all organizations and can be used to help set up health information exchanges and share data using nationally-recognized interoperability standards.

CONNECT can be used to:

- Set up a health information exchange within an organization
- Tie a health information exchange into a regional network of health information exchanges
- Tie a health information exchange into the NHIN

By advancing the adoption of interoperable health IT systems and health information exchanges, the country will better be able to achieve the goal of making sure all citizens have electronic health records by 2014. Health data will be able to follow a patient across the street or across the country.[8]

As the CONNECT NHIN software is updated quarterly by the ONC and CONNECT Team, it is further recommended that the State of GEHC implement an NHIN Gateway either:

As a managed service from a CONNECT certified vendor, with full quarterly upgrades and compliancy insured or
Budget and staff internally for the GEHC to insure the NHIN Gateway, based upon CONNECT standards, is upgraded, patched, and supported quarterly to insure full compliancy and interoperability with NHIN.

Figure 2 shows a conceptual grouping of NHIN services and specifications into groups of infrastructure specifications, exchange services, and profiles implemented by the CONNECT NHIN Gateway. The group “Foundation” contains core service interfaces and infrastructure supporting capabilities and applications. The second group “Capabilities” describes two core functionalities required for Inter-HIE data exchange: Discovery and Exchange. These functionalities are realized by the combination of underlying core services interfaces and profiles. Finally, the group “Applications” represents a set of use cases and workflows which can be developed and offered by leveraging foundations and capabilities.

[8] From http://www.connectopensource.org

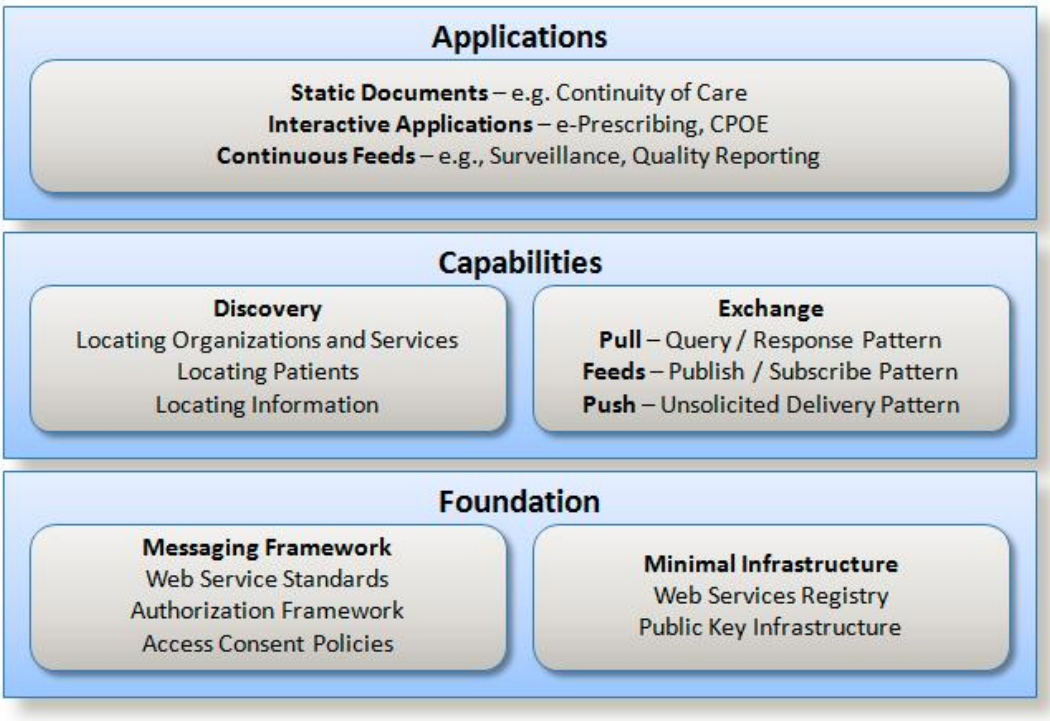


Figure 6 – Workflows

11.10.3 CONNECT NHIN Gateway API and Adapter Development

As shown in Figure 3, CONNECT SDK includes a set of interfaces and adapters. GeHC will have a NHIN Gateway and a suite of HIE engines and services that will need to be integrated with the NHIN Gateway through proprietary adapters.

The following is a set of efforts to be required for the NHIN Gateway development and maintenance.

- Ongoing updates on NHIN Core Service Interface Specifications as new specifications are developed and become available
- Ongoing updates on NHIN Core Service Interface Profiles
- Testing, installation, configuration, and upgrade of the CONNECT NHIN Gateway (CONNECT SDK) as a new version of CONNECT SDK is released quarterly
- Establishing new connectivity to federal agencies and/or other territory or statewide/regional HIEs

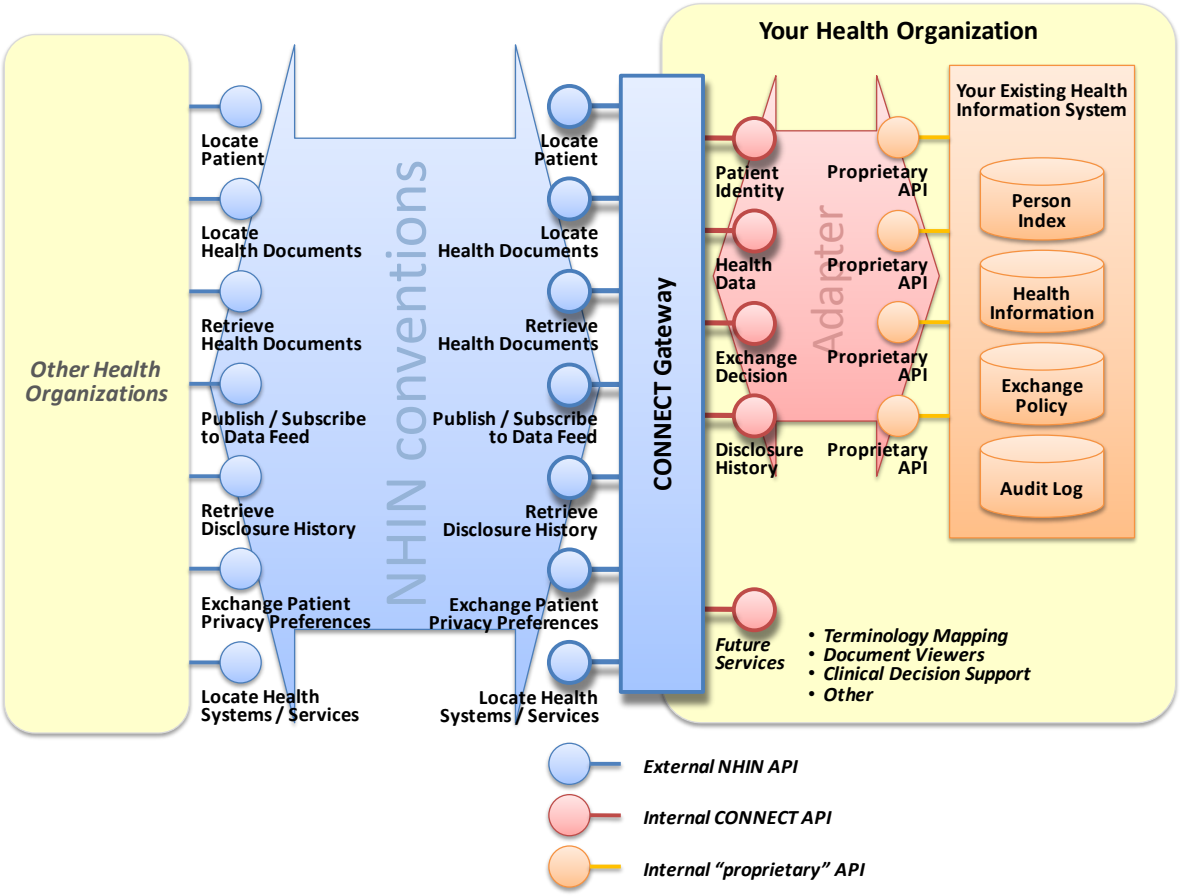


Figure 7 - CONNECT NHIN Gateway API

11.10.4 Connectivity to Federal Agencies

The following are a list of federal level projects currently identified. GeHC will leverage the NHIN Gateway to connect to federal agencies on various projects but are not limited to the following:

- Exchange of summary patient records for SSA Disability Determination Purposes
  - Agency: Social Security Administration (SSA)
  - Description: These electronic medical records, which will be sent through the Nationwide Health Information Network Exchange(NHIN Exchange), will significantly shorten the time it takes to make a disability decision and will improve the speed, accuracy, and efficiency of the disability program.
- Exchange of Summary Patient Records for the Virtual Lifetime Electronic Record (VLER)
  - Agencies: Department of Veterans Affairs (VA) and Department of Defense (DoD)
  - Description: The goal of VLER is to unburden the Veteran by having data available, when and wherever it is needed, by providing seamless access to all of the electronic records for service members as they transition from military to Veteran status and throughout their lives

- Biosurveillance and Case Reporting
    - Agencies: Center for Disease Control and Prevention (CDC)
    - Description: The purpose of this project is the implementation of near real-time, nationwide public health event monitoring to support early detection, reporting in GIPSE format, situational awareness and rapid response management across care delivery, public health, and other authorized government agencies
- CMS C-HIEP Project: Reporting de-identified quality assessment data to CMS
    - Agencies: Centers for Medicare and Medicaid Services (CMS)
    - Description: The project is about leveraging NHIN technology to enable HIEs and providers to submit de-identified quality assessment information to CMS for conducting quality assessment and improvement activities, including outcomes evaluation and development of clinical guidelines or protocols
- CMS esMD Project

Agencies: Centers for Medicare and Medicaid Services (CMS)
Description: The Electronic Submission of Medical Documentation (esMD) project will add additional choice to the providers along with existing three choices when responding to these documentation requests: mail paper, mail a CD containing a Portable Document Format (PDF) or Tag Image File Format (TIF) file, or transmit a fax. The new options enables providers to respond to these requests for medical documentation: electronic transmission via the Nationwide Health Information Network (NHIN)

11.11 SOA-based HIE Suite of Registries, Engines and Subsystems

Figure 7 shows the registries, engines, and subsystems to be included in the Hybrid architecture.

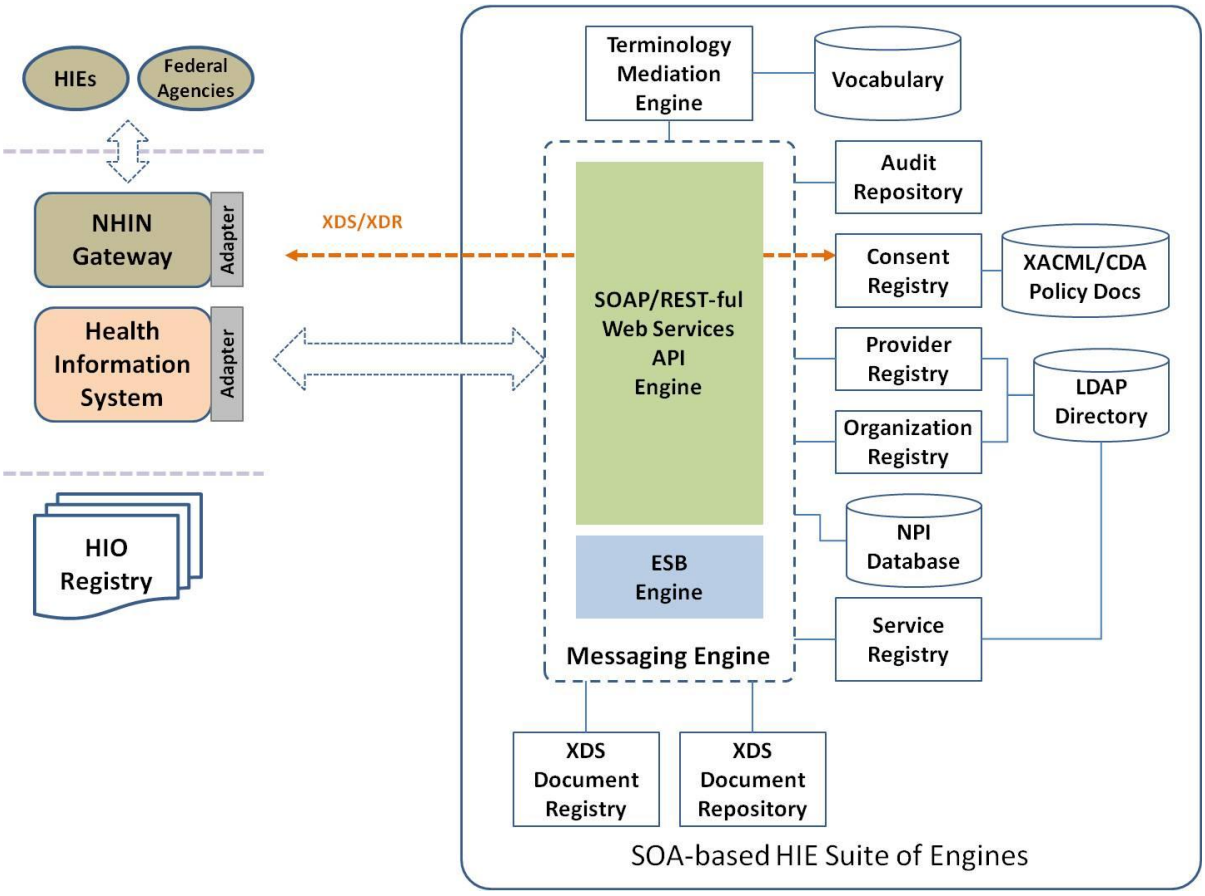


Figure 8 – Registry Architecture

11.11.1 Provider Registry

A centralized provider registry supports 1) lookup, 2) creation, 3) update of entries of healthcare providers (professionals and organizations). It should be integrated with National Provider Identifier (NPI) database. The provider registry needs to be exposed through standard APIs such as SOAP and/or RESTful Web Services APIs. In the cases dealing with health information systems with proprietary APIs, an Enterprise Service Bus (ESB) engine will be interfaced with the provider registry.

11.11.2 Consent Registry

The Consent Registry is a consistent source of a consumer's preferences, thereby enabling patient engagement and provider access to clinical information. The registry might need to be connected to any existing consent registries. It will comply with the NHIN exchange model – adoption of XACML for the format of Access Consent Policies (ACPs) and HITSP TP30 "HITSP Manage Consent Directives Transaction Package" adopting IHE's Basic Patient Privacy Consents (BPPC) which is HL7 CDA based. For the Exchange of Consent

document, following IHE profiles should be adopted: IHE Cross-Enterprise Document Sharing (XDS) document sharing protocol and IHE Cross-Enterprise Document Reliable Interchange (XDR).

11.11.3 Web Services Registry (UDDI)

For both Inter-HIE and Intra-HIE transactions, a set of Web Services endpoints should be registered and available on a service registry (the Service Registry) for trading partners (state stakeholders, federal agencies, or HIEs) to locate and utilize the statewide Web Services. It should be an implementation of the OASIS's Universal Description, Discovery, and Integration (UDDI) registry specification.

11.11.4 Web Services Endpoints and Messaging

It should be designed based on the Service Oriented Architecture (SOA) and needs to adopt SOAP based implementation of the SOA. Web Services is a technology that has recently emerged as a standard communication platform to overcome the interoperability problems. One of the key features of the Web Services technology is an ability to wrap existing resources (such as electronic medical records, scanned images, lab results etc) and expose them as services, available to other trading partners. This feature enables a healthcare enterprise to address the interoperability problems of their legacy/proprietary healthcare information systems.

All business use cases and workflows should be developed as standard SOAP or REST-ful Web Services and should be exposed through the Service Registry. A GUI based management tool should be built on top of the Service Registry to support management of the Service Registry: 1) register, 2) modify, and 3) delete, etc.

11.11.5 Integration and Message Transformation

HIE architecture will leverage Web Services standard technology (WSDL, SOAP, and UDDI) to realize SOA – defining, publishing, and using web services. It also should implement Web Services profiles (WS-I Basic Profiles and WS-I Security Profiles) as a standard messaging platform for the XML-based messaging exchange. It also should be able to address heterogeneity of the underlying database systems and health information systems (HIS).

11.12 Value Proposition: Business Use Case and Service Offerings

GeHC has the opportunity to provide improved workflows, patient outcomes, improved care, and full Meaningful Use compliancy. A critical part of Meaningful Use is the ability to exchange clinical data between providers within the GeHC as well as between Guam, American Samoa, Saipan, Hawaii, and the US mainland and Federal Agencies

11.12.1 Initial Data Elements for HIE exchange From the Environmental Scan

One of the questions posed to the Environmental Scan participants was "If this HIE work had to be done in stages, what are data elements you would desire in the first release?" The feedback was fairly consistent across the participants. Most indicated they wanted a fully functioning HIE from the beginning but understood that may not be financially possible. The data elements most often cited as most desirable in the first release include:

- Patient demographics
- Chief complaint
- Medications
- Allergies
- Latest labs and/or radiology results
- Immunizations

In later releases, participants would like to see the following data elements included:

- Quality indicators
  - Medical history
  - Advance Directives
  - Disease management information
- Public health reporting
- Peer review
- Trending and benchmarking

11.12.2 User Stories

Table 11 – User stories

Actors	Use Stories
HIE to HIE	▪ Cross-State exchange of health information HIE to Federal Agencies (CMS, SSA, DoD, VA, IHS etc) Provider's Quality Measures Reporting to CMS over NHIN (PQRI) Provider's Quality Measure Reporting to State over NHIN (PQRI) State's public health data reporting to CDC (GIPSE) Medicaid Connectivity to CMS Medicare Connectivity to CMS
Provider to Patient	▪ Patient Health Record ▪ Patient Record Access Consent Management
Provider to Provider	▪ Electronic Referrals ▪ Electronic Disease reporting ▪ Clinical Messaging
Provider to Laboratory	▪ Electronic Lab Ordering ▪ Electronic Lab Results Reporting
Provider to Pharmacy	▪ Electronic Prescribing
Provider to Public Health	▪ Electronic immunization reporting ▪ Electronic Disease reporting
Provider to Payers	▪ Eligibility ▪ Claims ▪ Prior Authorization

11.12.3 Specific Use Cases for the Territory of Guam

Of particular relevance are use cases. During the environmental scan a number of themes became abundantly clear. Satisfying the needs of these use cases will improve HIE adoption rates and drive toward sustainability.

11.12.4 Emergency use case

When a patient is admitted to an emergency room, immediate access to basics like immunization, current medications, recent lab histories and allergies can make a real difference in the quality of patient care as well as the efficiencies gained within the provider institution.

11.12.5 Continuity of Care

This is particularly true for patients sent for tertiary treatment or transferred to another type of care (long-term care, referral to the state hospital, etc.) Additionally, many of the providers in Guam expressed concerns related to patients that seek care in the Philippines, Hawaii and the US mainland. They were concerned that patient information could not be exchanged freely between these territories, state and countries. Similar opportunities exist for patients that are referred to Guam from American Samoa, NMI and Saipan. Concerns were also expressed for transient citizens who may travel to other Asian countries as Guam is a vacation destination..

11.12.6 E-Prescribing

The ability for providers to have electronic prescribing, with medication history, could be a use case for strong consideration by the Territory of Guam and GeHC. The migration of providers from a paper based or semi-electronic prescribing process to a fully integrated, electronic prescribing process (with medication history) could provide an immediate positive impact on the quality of care of patients in Guam. Therefore, providers adopting EHR technology should include E-Prescribing in their EHR and selection.

11.13 Continuity of Care Document Provisions

The Continuity of Care Document contains 17 primary data fields. GeHC plans to satisfy all Meaningful Use requirements by building the capacity to exchange all CCD data elements as defined for each stage of Meaningful Use.

- *Header*: Defines the type of document being created, who the document is regarding (patient, physician, author) and how the document relates to other existing documents (if applicable).
- *Purpose*: States the reason the document was generated, but only if a specific purpose is known (i.e., a referral, transfer, or by request of the patient).
- *Problems*: Provides a list of relevant clinical problems, both current and historical, that are present for the patient at the time the document was created.
- *Procedures*: Provides a list of all relevant and notable procedures or treatments, both current and historical, for the patient.
- *Family History*: Gives relevant family health information that may have an impact on the patient's healthcare risk profile.
- Social History: Describes the patient's lifestyle, occupation, and environmental health risks plus patient demographics such as marital status, ethnicity and religion.

- *Payers*: Provides payment and insurance data pertinent to billing and collection, plus any authorization information that might be required.
- *Advance Directives*: Includes information about wills, healthcare proxies and resuscitation wishes, including both patient instructions and references to external documents.
- *Alerts*: Provides a list of allergies and adverse reactions that are relevant for current medical treatment.
- *Medications*: Provides a list of current medications and relevant historical medication usage.
- *Immunizations*: Gives information the patient's current immunization status plus pertinent historical information about past immunizations.
- *Medical Equipment*: Provides a list of medical equipment and any implanted or external devices relevant to patient treatment.
- *Vital Signs*: Details information about vital signs for the time period including at a minimum the most recent vital signs, trends over time, and a baseline.
- *Functional Stats*: Detailed information about what is normal for the patient, deviations from the norm (both positive and negative) and extensive examples.
- *Results*: Lists lab and procedure results, and at a minimum, lists abnormal results or trends for the time period.
- *Encounters*: Details relevant past healthcare encounters including the activity and location.
- *Plan of Care*: Lists active, incomplete or pending activities for the patient that are relevant for ongoing care – including orders, appointments, procedures, referrals and services.

11.14 Guam Roadmap

As providers move towards the goal of meeting the meaningful use criteria, the selection and implementation of certified and compliant Electronic Health Records (EHRs) is of key issue and focus. The Territory of Guam Health Information Exchange has selected the overall roadmap and strategy for the HIE. The HIE providing some key components for providers to achieve meaningful use, including limited applications and services, but not including an integrated, HIE offering of an Electronic Health Record or EHR-affiliated modules, applications and services such as E-Prescribing, CCD generation, etc.

The Territory of Guam HIE roadmap and infrastructure will be selected and architected to provide the key interoperability and reporting criteria for meaningful use while allowing providers to select and implement their own EHR and EHR related solution.

11.14.1 Supporting Providers with Existing EHRs While Utilizing Industry Standards:

The Territory of Guam has providers who have implemented, as well as providers who are considering implementing commercial EHRs as well as providers who have implemented (or are strongly considering implementing) the VistA and/or the RPMS Electronic Health Record products and solutions. The Territory of Guam Health Information Exchange can and will support both VistA and the RPMS EHRs, as well as commercial EHRs, and specific HIE EHR solutions, interfaces, and offerings will be included on the roadmap and architecture. Of specific importance is the integration of disparate clinical systems to support clinical data exchange from certified and compliant EHRs, including full support for bi-directional CCD exchange, or Continuity of Care Document, within and to the Territory of Guam HIE. Overall HIE specific offerings, including a potential EHR offering, is currently under consideration for inclusion in the overall architecture and will be specifically addressed in the final Strategic and Operational Plan for the Territory of Guam Health Information Exchange.

Utilizing standards based EHR technologies, along with supporting the CCD format, NHIN, and the IHE standards, the Territory of Guam Health Information Exchange can insure full interoperability within the HIE as well as with trading partners in the United States (state Health Information Exchange, state agencies, Federal agencies, etc) as well as international countries and trading partners.

The ability to build and support an IHE (Integrating the Healthcare Enterprise) standards-based, NHIN compliant Health Information Exchange (with bi-directional CCD clinical data exchange) for the Territory of Guam is critical for interoperability between disparate clinical systems, other states, and other countries.

11.14.2 Support for the Vista EHR, RPMS EHR, and VLER:

The Veterans Health Information Systems and Technology Architecture (VistA) is a freely distributed open source enterprise level information system built around electronic health records and used by the Veterans Health Administration, making it one of the largest EHRs in the world. VistA's open source nature makes it highly useful and customizable to healthcare providers outside of a VA Medical Center. VistA was originally built as many individual applications, rather than as a comprehensive program, and as a result, functionality and features can vary. VistA does support functions such as EHR functionality, CPOE, bar code medication administration, clinical guidelines, e-Prescribing, and HL7 standards. It can also support other functionalities such as infrastructure and administrative needs.

The most promising component of VistA is the CHDR, or Clinical and Health Data Repository. The CHDR is being utilized to allow interoperability between the Department of Defense (DoD) and VA health record systems to enable continuity of care for individuals as they transition from active military status to veteran status. Another system in development to handle the same process as the CHDR is called the Bidirectional Health Information Exchange to enable real time data exchange between the two departments.

The underlying technology used in both VistA and RPMS is a programming language called the Massachusetts General Hospital Utility Multi-Programming System (MUMPS, or M). The MUMPS programming language was used by private companies in the healthcare and financial sectors for a period of time, but is now largely been phased out. Nearly all healthcare facilities run by the VA, IHS, and Department of Defense (DoD) utilize MUMPS for clinical data tracking. The main concern with the MUMPS language is not necessarily that the technology is unable to perform the functions of an EHR, but that programmers are becoming increasingly difficult to find and increasingly expensive compared to modern programming languages. Declining programmer support results in a risk to the long-term outlook and overall for both VistA and RPMS, and must be a consideration in the future adoption and rollout of both EHRs in and to the providers of Guam.

In fact, the VA recently commissioned the Industry Advisory Council of the America Council for Technology to recommend the future of VistA. The recommendation called for the VA to update its VistA system in order to continue meeting needs of American veterans. VistA is the oldest legacy technology system still in use by the government, and an update has been needed to maintain the needs and continuity of care for veterans.

It should be noted that RPMS is based on VistA and continues to share code with the VistA program. As a result, the fate of VistA likely will hold the future for RPMS as well. If a rebuilt VistA occurred in the open source and modern programming language that the council suggests, a new RPMS could be rapidly built and deployed based on the new VistA.

The RPMS EHR offers many short-term advantages over the VistA EHR and other commercial EHRs. The main short-term advantage is RPMS' applications for specific healthcare needs, such as serving a diverse population. Below is a list of the services and applications added to VistA for the RPMS offering:

RPMS Offering Beyond VistA:

- VueCentric user interface
- A Women's health tool
- A Children's health tool
- An Obstetrics tool
- A Patient Account Management tool

Although RPMS does offer some tools beyond VistA, RPMS is still limited by MUMPS programming language. The short-term impact of working with a system based on MUMPS is an additional challenge of finding a technical team with expertise in MUMPS, thus making servicing, updating or upgrading/interfacing clinical systems more challenging. Thus, widespread adoption of the VistA EHR or RPMS EHR by the providers of Guam must also include a plan for interoperability with other systems and the HIE itself, requiring VistA and RPMS interface implementation for and with the Territory of Guam Health Information Exchange.

Another important consideration is support and inclusion of the VLER project on the roadmap and architecture for the Territory of Guam Health Information Exchange. The Virtual Lifetime Electronic Record (VLER), which contains an individual's administrative and

medical information from the start of military service continuing after they leave the military, is an initiative to exchange interoperable information between the VA and Department of Defense (DoD). While the VLER project is in various pilot and limited production phases, the impact of VLER on the lives of military personnel and the Territory of Guam HIE could be significant, therefore the Territory of Guam Health Information Exchange will support VLER and include VLER support on the architecture and roadmap for the HIE.

11.14.3 Integrating the Healthcare Enterprise (IHE)

Integrating the Healthcare Enterprise (IHE) was formed by HIMSS, the Healthcare Information and Management Systems Society, and the RSNA, Radiological Society of North America, and is an initiative by healthcare professionals to improve the way healthcare information is shared between systems and organizations around the world, for the purpose of improving the overall quality of healthcare to patients. IHE does not create new standards, but instead drives adoption of existing standards such as HL7, DICOM, and W3C. The regions in Asia-Oceania that participate with the IHE include Australia, China, Japan, Korea, New Zealand, and Taiwan.

EHR systems supporting IHE profiles generally work together better, are easier to implement, and help providers utilize information more efficiently. An IHE profile is a technical definition or standard that provides “a common language for purchasers and vendors to discuss the integration needs of healthcare sites and the integration capabilities of healthcare IT products.” To ensure that EHR systems comply with IHE requirements, the IHE hosts connectathons allowing vendors to showcase their systems and technology.

Many EHR vendors and Health Information Exchange vendors and suppliers worldwide, including foreign nations, are participating in the IHE workgroups and adopting IHE standards. As participation and adoption of IHE standards and profiles grows, so grows the ability for disparate systems and infrastructures to interface, integrate, and communicate data freely. As the Territory of Guam has an ever increasing number of workers and visitors from other countries, it is critical to adopt standards, profiles, and an overall interoperable infrastructure to not only support clinical and administrative data exchange to and from the United States, but also with other countries, territories, and nations. By building off of the IHE standards and profiles, the Territory of Guam can nearly immediately have interoperable, bi-directional data exchange with Australia, China, Japan, Korea, New Zealand, Taiwan, as well as encourage any missing critical countries/trading partners to adopt these IHE standards. With interoperable data exchange with other states, territories, countries and nations, the Territory of Guam Health Information Exchange can impact care for residents and visitors alike, reduce costs, and improve overall healthcare outcomes.

Therefore, in order to build and operate a truly interoperable, global Health Information Exchange to support both residents and visitors, The Territory of Guam Health Information Exchange will adopt IHE standards and profiles to promote interoperability and clinical data exchange locally, regionally, nationally, and internationally.

11.15 Technical Infrastructure Strategies

The GeHC will use the following strategies to successfully build the Guam HIE.

11.15.1 Determine the HIE Architecture

The following strategies for determining the HIE architecture will be employed:

- GeHC will be designed as a federated hybrid model with the ability for the following data elements to be accessed:
  - Patient demographics
  - Problem list
  - Allergies
  - Current medications
- GeHC will be architected and constructed with minimum required data elements and cost effective disaster recovery as a key component so any centrally stored data is secured
- Any remaining data elements of the Meaningful Use requirements will be stored at the provider level and a master patient index will be used to locate specific patient information upon authorized request
- GeHC will allow for the bi-directional exchange of healthcare information as required by Meaningful Use
- GeHC will provide a single standard method of access to connect to interoperable and certified EHRs. It will be the responsibility of each provider to connect their EHR technology to the HIE and to have their own certified HER with E-Prescribing and optional administrative transaction support
- GeHC will support a standard personal health record (PHR) for patients to share their medical information when and from where they determine
- GeHC will be constructed so that stakeholders can choose from a list of services when connecting to the HIE. These services may include:
  - Patient PHR
  - Lab orders and results
  - Quality Reporting
  - Payer connectivity
  - Medicaid connectivity (when supported by Medicaid)
  - Public health reporting
  - CCD clinical data exchange

11.15.2 NHIN Connections

The following strategies for connecting to NHIN will be employed:

- GeHC will execute the Data Use and Reciprocal Support Agreement (DURSA) with DPHHS on behalf of all Guam providers
- GeHC will provide the primary connection to the NHIN for all Guam providers participating in the HIE.
- Patients from other territories and states will be connected through the NHIN to their healthcare provider.
- GeHC will work with ONC to find ways to connect with other countries

11.15.3 Proposed Technologies

To increase adoption of health information technology by providers of care, the following strategies for supporting the HIE include:

- Provide web portal (ASP model) by which providers can share health information (such as medication history) and by which patients may be able view their records via a PHR

- Provide Continuity of Care Document (CCD), which may include information of value– such as medication history, clinical messaging, results reporting, leading to a sustainable business model
- Connect to and integrate with other systems such as PHRs
- Functional Requirements include:
    - Upload or register patient records
        - Allow hospital/clinic to upload or register CCD
        - Allow laboratory to upload or register patient lab results
        - Ensure lab data integrity, informed by the Clinical Laboratory Improvement Act (CLIA) and Guam law pertaining to lab data
        - Allow hospital to upload or register discharge summary reports
        - Allow Emergency Department (ED) to upload or register summary reports
        - Allow radiology service to upload or register imaging reports
    - Display results and reports correctly from different sources about the patient
    - Allow users to log into the system with at a minimum a username and password
    - Provide functionality for the user to query and identify the correct patient via a record locator service
    - Allow the user to view records about the patient
    - Allow the user to print selected records
    - Allow the user to save selected records for a patient to disk or other media
    - Support creation of user roles, at a minimum to include:
        - Clinicians
        - Patients
        - Health information exchange administrator
    - Manage the identity and registration of users
        - Manage Patient identity and registration
        - Manage Clinician identity and registration
        - Manage Other User identity and registration
        - Manage health information exchange administrator identity and registration
    - Allow the Patient to opt in or out of the health information exchange
    - Allow the patient to designate authorized users to access their records
    - Create audit trails, at a minimum to include:
        - Audit each User logon to system
        - Audit each User query of patient identity
        - Audit each User query of patient records
        - Audit each User viewing of patient records
        - Audit each registration or upload of patient records to the system
        - Audit each unsuccessful User logon to system

12.0 Business and Technical Operations

Business and Technical Operations addresses how Guam will develop Health Information Exchange capacity. The Business and Technical Operations Domain Team will be convened upon approval of the Strategic and Operational Plan (SOP) to assist the GeHC Board with their primary work activities during the implementation of the SOP. GeHC understands that various organizations across the Territory of Guam have different operational procedures and part of the work of the Business and Technical Domain Team will be to reconcile the differences and consider the most efficient operation structure, policies and procedures for the Guam Health Information Exchange. In addition, the Business and Technical Operations Domain Team will define the following primary work activities:

- Determine current HIE capabilities across the state
- Define how data exchange mechanisms can leverage existing services
- Develop the operating principles for the HIE
- Develop standard operating procedures and processes for HIE services
- Build stakeholder support for operational services
- Identify policies for connecting to the NHIN and the nationwide HIE

12.1 Assumptions

The Business and Technical Operations Domain Team is chartered to use the following set of assumptions

- Leverage the existing capacities of health information technology in Guam
- Coordinate with state and federal programs
- Develop uniform policies and procedures
- Coordinate with the other Domain Teams

12.2 Operational Rules

The Business and Technical Operations Domain Team is chartered to design the business operational rules to:

- Leverage current health HIE capacity
- Develop additional HIE capacity
- Address Meaningful Use
- Connect with other territories, Hawaii and the US mainland
- Create a plan to reach all providers in Guam with EHR technology

12.3 Coordination with Other Domain Teams

Because much of the work of the Business and Technical Operations Domain Team is driven by the work of the other Domain Teams, it was decided that one member of the Business and Technical Operations Team will be assigned to sit with the other teams to gain a better understanding of the points of intersection and keep all of the work team efforts aligned.

12.4 Environmental Scan Issues

The Environmental Scan identified several critical issues that stand as barriers to the successful implementation of health information exchange in Guam. If GeHC is to fulfill the vision for

improving the quality of care in Guam, the Business and Technical Operations Domain Team will specifically addresses and resolve the following issues.

12.4.1 Adoption

HIT adoption will be driven by the willingness of physicians and other health care providers from across the state to adopt the new technology. In many ways, this makes HIE adoption a large scale change management project. Change is discussed in the next section and the difficulty of change for most people will slow wide spread adoption.

12.4.2 Change Management

Provider adoption is critical to the success and sustainability of the GeHC. Change is difficult for most people so in order to increase adoption rates across the state, a process will be developed to help people recognize the need for change and to help them successfully manage through the changes made necessary by the addition of health information technology. Offering to help people cope with the necessary changes associated with EHR technology and the exchange of information will quicken the pace of adoption.

Awareness of the resistance to change will inform all procedures, process and policies for the GeHC. The Business and Technical Operations Domain Team will construct procedures, policies, and processes that facilitate the ability of people across the territory to deal with the complexities of change.

12.4.3 Time

Implementing an HIE requires a long-term commitment of resources. Because of the time commitment required, it becomes important for the Business and Technical Operations Domain Team to design a strategy to keep stakeholders engaged. The Team will work with all stakeholders to ensure they understand the time commitment required and work to obtain stakeholder commitment to the long-term success of the GeHC. The basic elements for obtaining the commitment of a diverse stakeholder group include:

- Alignment with each stakeholder's value proposition and their expected return on investment
- Establishing realistic expectations related to the time and resource commitment
- Informing stakeholders early in the process as to the expected deliverables for each stage of HIE implementation

12.4.4 Project Management

Constructing and operating the GEHC will require significant project management experience. In order to manage the overall project, the proper resources and skill sets will be assigned to this project. These skill sets include:

- Knowledge of HIE
- Experience with large scale, multi-year projects
- Familiar with diverse healthcare stakeholders
- Understands the culture of healthcare in Guam

12.5 State-Shared Level Shared Services

The Medicaid Bureau and the HIE are part of same state agency – The Department of Public Health and Human Services. The major issue limiting coordination with other territorial agencies is the lack of current automation in Medicaid and Public Health. Medicaid has no ability today to exchange information and Public Health is limited to immunization data.

12.5.1 Medicaid

Because of our Medicaid's impact on the entire healthcare structure, it is important to the Medicaid agency to have an active participation role in the HIE project. The American Recovery and Reinvestment Act (ARRA) provides funding assistance to states to complete their Medicaid State Health Information Technology Plans (SMHPs) and their Statewide HIE Strategic and Operational Plan. Integrating these two efforts will be important and having strong coordination between these two critical projects will ensure GeHC will provide the best service to all patients in Guam. Towards that end, GeHC will charter the Business and Technical Operations Team to conduct the following activities:

- Identify the needs of the State Medicaid Agency and integrate the HIE Strategic and Operational Plan into the SMHP
- Identify and integrate the needs of the Medicaid providers into the HIE Strategic Plan

12.5.2 Medicare

The Business and Technical Operations Domain Team will consider coordination of Medicare and other federally funded state based programs as part of the Strategic and Operational Planning priorities. Specifically, the team will provide information and recommendations for Guam as part of the Operational Plan including:

- Electronic prescribing (e-Prescribing) – physicians will enable e-Prescribing with drug interaction checking through their selected EHR
- Structured lab results – include the electronic exchange of structured lab results with all clinical laboratories in Guam
- Interoperability priorities – include all authorized health care providers across Guam to connect to the HIE
- Implementation of Electronic Health Record technology by providers – included Guam Memorial Hospital, physicians and other providers Meet standardization and certification requirements – Guam providers have to meet the "Meaningful Use" of certified EHR technology requirements in order to take advantage of the Medicaid and Medicare payment incentives.
- Assist physicians meet the 2011, 2013 and 2015 Meaningful Use requirements and qualify for ARRA stimulus funding

12.5.3 Nationwide Health Information Network (NHIN)

Many of the NHIN data specifications and standards have been completed, while others are still in development or awaiting development. The Strategic and Operational Plan for the statewide HIE will require adoption of all current NHIN standards and specifications, as well as the adoption of future standards and certifications. NHIN standards will ensure that the

HIE is currently coordinated with state and federal efforts and that future specifications will support increased interoperability.

12.5.4 Coordination of Medicare and Federally Funded, State Based Programs

The statewide HIE will incorporate Nationwide Health Information Network (NHIN) standards to ensure the coordination with Medicare and federally funded, state based programs. In addition, the HIE will develop coordination efforts with Federal Agencies, such as the Social Security Administration (SSA) disability insurance programs, CMS, the CDC, Veterans Administration (VA), and the Department of Defense (DoD).

12.5.5 Public Health

Identify and integrate the needs of public health providers into the Strategic Plan, ensuring Public Health is in full alignment with CDC and NHIN, including facilitating any discussions with senior leadership at CDC to insure proper coordination and alignment.

12.6 Business and Technical Operations Health Information Strategies

The Business and Technical Domain Team will be responsible for the following strategies for constructing and operating the Health Information Exchange.

12.6.1 Stage 1 Meaningful Use Required Services (2011 and 2012)

GeHC will enable all health care providers to meet the requirements of Meaningful Use as the federal regulatory scheme guidelines and deadlines evolve, including but not limited to:

- E-Prescribing through the provider EHR
- Clinical lab results electronically
- Health department immunizations, syndromic surveillance, and notifiable lab results
- CCD requirements for Stage 1 Meaningful Use including the exchange of data between disparate systems
- Quality reporting
- Payer connectivity

12.6.2 Stage 2 Meaningful Use Required Services (As additional requirements are defined)

GeHC will enable all health care providers to meet the requirements of Meaningful Use as the federal regulatory scheme guidelines and deadlines evolve, including but not limited to:

- Expanded Continuity of Care Documents – Stage 2
- Advance Directives
- Personal Health Records

12.6.3 Establish Standard Operating Procedures, Operations and Functions

GeHC will employ standard procedures, operations and functions that will provide efficiencies and improved access to healthcare data, including but not limited to:

- All stakeholders will follow adopted national standards for exchanging healthcare data and information

- All applications connecting to the HIE will meet current certification requirements
- Meaningful Use criteria, as specified by ONC will be used to determine the priority of the healthcare information exchanged

12.6.4 Population Health Data

The HIE will be a gateway for population health data reporting including:

- Quality Reporting
- Clinical Data
- Workforce safety
- Public Health immunizations, syndromic surveillance and notifiable laboratory results

12.6.5 Core Capabilities

Define and determine the core capabilities for the statewide HIE to provide value for HIE participants

- GeHC will function as a utility supporting the stakeholders needs for sharing and exchanging clinical and administrate healthcare data and information
- GeHC will be constructed to allow for normal growth and expansion based on changing needs and new technologies
- GeHC will have a bi-directional connection to the Public Health Immunizations registry so information can be readily available to providers

12.6.6 Maintaining and Transferring Knowledge

Support adoption of HIT/HIE by maintaining expert knowledge in the evolving EHR and HIT marketplace

- GeHC will become a primary source of HIT knowledge and information for providers
- GeHC will become a key source for Privacy and Security information
- GeHC will provide information to providers on evolving state and federal standards

12.6.7 Education

GeHC will collaborate with other Territorial, State and Federal programs to provide awareness and education to providers and consumers including:

- TIPC – The Regional Extension Center for Guam
- University based training programs similar to University of Guam Medical Centers Bachelor and Master programs

12.6.8 Harmonization with Federal Standards

GeHC will adopt policies and procedures for the operation of the HIE while ensuring consistency with all federal standards

- Federal standards will be incorporated integrated with GeHC standards as necessary to support NHIN, IHE and CCD
- Align with the Federal Health Architecture (FHA) and NHIN

12.6.9 Align with Medicaid

GeHC will coordinate with Medicaid to establish an integrated approach to all HIE process and procedures, such as:

- Ensure Medicaid continues to have representation in the GeHC Governance structure
- Enable electronic Meaningful Use and clinical reporting to Medicaid
- Work with Medicaid to align the HIE with the Medicaid State Health Information Technology Plan (SMHP)
- Coordinate with Medicaid and the Regional Extension Centers to advance stakeholder adoption of HIT across Guam
- Analyze Medicaid claims data to identify ways the HIE can improve and enhance the success rate of claims processing

12.6.10 Align with Public Health Programs

GeHC will coordinate with Public Health programs to establish an integrated approach including having Public Health represented in the Governance structure and process.

- Integrate the various Public Health responsibilities into the HIE to facilitate the collection and dissemination of data including:
- Immunization information
- Laboratory information
- Public Health statistics
- Biosurveillance/syndromic surveillance reporting
- Healthcare associated infection information
- Others as required
    - Enable the distribution of Public Health information in Guam
    - Provide for users to obtain health, socio-economic and demographic analysis for planning, intervention and evaluation of programs

12.6.11 Leveraging HIE Capacities

Support the efforts of the existing organic ecosystems to grow and build their exchange capacities.

- Conduct a more detailed level analysis to identify existing HIE capacity and capabilities across Guam
- Connect with various state associations and boards to leverage their knowledge about their members HIT capacities and capabilities

12.6.12 Rural Provider Practices

Rural provider practices will be a priority for GeHC and an important part of the immediate work will be to identify all of the rural providers that need financial assistance.

- Conduct an inventory and then create an outreach and education program to provide assistance to rural providers about HIT
- Coordinate with the Regional Extension Centers to provide information about the rural providers needs concerning adoption of health information technology and connecting with other providers through the HIE

13.0 Legal and Policy

13.1 Overview

Guam is committed to developing and implementing a secure and efficient territory-wide Health Information Exchange that includes the exchange of protected health information, or "PHI" as it is defined under the Health Insurance Portability and Accountability Act of 1996 ("HIPAA") within its own region, as well the rest of the Norther Mariana Islands, America Somoa, the states of Hawaii and California and the Republic of Philippines. The Guam Health Information Exchange will be developed in a way that is consistent with Federal and territory privacy and security rules and regulations (e.g. Territory Statutes, HIPAA, and the Health Information Technology for Economic and Clinical Act ("HITECH"), and where appropriate, the Principles articulated in the Office of National Coordinator for Health Information Technology's, *Nationwide Privacy and Security Framework for Electronic Exchange of Individually Identifiable Health Information* ("Privacy and Security Framework").

13.2 Identification and Harmonization of territory and Federal Laws

Guam will need to identify, analyze and harmonize its Territory laws with federal laws such as HIPAA, HITECH, and the federal 42 CFR Chapter 1 Public Health Service, Department of Health and Human Services, Part 2 Confidentiality of Alcohol and Drug Abuse Records ("42 CFR Part 2)). It will also be important for Guam to understand the privacy and security laws of Hawaii, California, the rest of the Northern Mariana Islands and American Samoa when exchanging PHI with these states and Territories. Although the Republic of the Philippines is not under United State Jurisdiction, Guam will need to ascertain whether there are any privacy and/or security laws from the Republic of the Philippines that may impact the ability to electronically exchange PHI. The following laws will need to be reviewed, analyzed and harmonized:

13.3 Guam Annotated Code, Title 10, Health and Safety, Chapter 82, Mentally Ill Persons, § 82605, Confidentiality of Information in Records; Persons to Whom Disclosure Authorized.

This statute establishes confidentiality provisions for voluntary and involuntary treatment for mental health. It states:

"All information and records contained in the course of providing service to either voluntary or involuntary recipients of services shall be confidential. Information and records may be disclosed only:

- In communication between qualified mental health professionals in the provision of services or appropriate referrals, or in the course of conservatorship proceedings;
- When the qualified mental health professional staff in charge of the patient, with the approval of the patient or his attorney, conservator or guardian, designates persons to whom information or records may be released, except nothing in this Chapter shall be construed to compel a physician, psychologist, social worker, nurse, attorney, or other professional person to renewal information which has been given to him in confidence by

members of the patient's family. No record may be released under this subsection after ten (10) years have elapsed since the record was made;

- To the extent necessary to make claims on behalf of the a recipient for services for aid, insurance, or medical assistance to which he may be entitled
- If the recipient of services is a ward or conservatee, and his guardian or conservator designates, in writing, persons to whom records or information may be disclosed, except that nothing in this Chapter shall be construed to compel a qualified mental health professional, psychologist, social worker, nurse or attorney, to reveal information which has been given him in confidence by members of a patient's family.

This section also contains confidentiality provisions for research on mental health records.

13.4 Guam Annotated Code, Title 10, Health and Safety, Chapter 80, Guam Memorial Hospital Administration § 80114, Patients' Records Confidential.

This statute sets forth confidentially provisions for patient medical records created and maintained by the Guam Memorial Hospital Authority, including inpatient and hospital based outpatient clinics. It states:

"Patients' medical records are confidential and copies thereof may be released only upon the written consent of the patient involved or by written order of the Superior Court of Guam; provided, however, that any information, data or reports with respect to cases of malignant disease may be furnished to, or procured by, the Guam Tumor Registry-Tumor Clinic, Guam Memorial Hospital, for statistical, scientific and medical research and no physician, surgeon, dentist, institution or hospital, furnishing such information, data or reports to the Guam Tumor Registry-Tumor clinic, Guam Memorial Hospital, shall by reason of such furnishing be deemed to have violated the provisions of this Section, or have violated any confidential relationships or be held liable therefore."

13.5 Guam Annotated Code, Title 10, Health and Safety, Chapter 4, Universal Newborn Hearing Screening and Intervention Act (UNHSIA) of 2004.

This statue sets forth confidentiality provisions for data related to newborn hearing screening. It states:

"The DPH&SS and all other persons to whom data is submitted in accordance with this Act shall keep such information confidential. Not publication or disclosure of information shall be made except in the form of statistical or other studies which do not identify individuals, except as specifically consented to in writing by the parent(s) of the tested child."

13.6 The Privacy and Security Rule of the Health Insurance Portability and Accountability Act of 1996 ("HIPPA").

The HIPAA Privacy Rules establish minimal requirements for the use and disclosure of PHI. Under these rules, PHI may be accessed, used and/or disclosed without patient authorization for treatment, payment or health care operations purposes. The HIPAA

Security Rules establish minimum security requirements for creating, maintaining and exchanging electronic protected health information.

13.7 HITECH

Provisions under HITECH strengthened the HIPAA Security Rules and expanded coverage of the requirements to additional entities. HIPAA and HITECH regulations will provide the basis under which Guam Health Information Exchange will operate.

13.8 Federal 42 CFR Chapter 1 Public Health Service, Department of Health and Human Services, Part 2 Confidentiality of Alcohol and Drug Abuse Records ("42 CFR Part 2).

42 C.F.R. Part 2 broadly protects *all information* about any person who has applied for or has been given a diagnosis or received treatment for alcohol or drug abuse at a federally assisted program ("Program"). Program means "an individual or entity, or an identified unit within a general medical facility that holds itself out as providing, and provides alcohol or drug abuse diagnosis, treatment or referral for treatment." Program also means "medical personnel or other staff in a general medical care facility that are identified as having a primary function of providing alcohol or drug abuse diagnosis, treatment or referral for such treatment." Federally assisted means "conducted, regulated or directly or indirectly assisted (e.g. pays for services) by any department or agency of the United States."

Information created and maintained at a Program may not be disclosed unless the patient has provided written consent or unless another very limited exception specified in the Statute applies.

The only treatment related exception to the consent requirement is "to medical personnel to the extent necessary to meet a bona fide medical emergency." Under this exception, information may be disclosed to medical personnel who have a need for the information for the purpose of treating a condition "which poses an immediate threat to the health" of the individual and "which requires immediate medical intervention."

It is important to have a good understanding of this statue because if this statute applies, in general, any information subject to it can only be accessed and/or disclosed pursuant to patient written authorization. Moreover, this statue places additional restrictions on the information subject to it, such as a prohibition on redisclsoure (unless specifically permitted) and a requirement that certain statements be appended to any information disclosed.

Recently, the Substance Abuse and Mental Health Services Administration of the U.S. Department of Health and Human Services (the agency that wrote 42 CFR Part 2) published a guidance document entitled, "Frequently Asked Questions, Applying the Substance Abuse Confidentiality Regulations to Health Information Exchange." This guidance document will also have to be reviewed and analyzed.

13.9 Other Federal Statutes

Guam will review and analyze additional federal statutes to determine any impact they may have on activities and processes contemplated by the Health Information Exchange. These may include (depending on the purposes for which the health information will ultimately be used), but are not limited to:

- The Federal Privacy Act (5 U.S.C. § 552a);
- The Freedom of Information Act (5 U.S.S. § 552; also 45 C.F.R. Part 5)
- Medicaid Privacy Requirements (42 U.S.C. §1396a(a)(7) and 42 C.F.R. §§ 431.300-307)
- Genetic Information Nondiscrimination Act of 2008 (GINA) (Pub. L. No. 110-233)
- Clinical Laboratory Improvement Amendments (42 U.S.C. §263a and 42 C.F.R. § 493.1291)
- Controlled Substances Act (21 U.S.C. § 801 and 21 C.F.R. § 131623)
- Federal Policy for the Protection of Human Subjects (45 C.F.R. §§ 46.11(a)(7), 46.116(a)(5)
- Federal Certificate of Confidentiality (research subjects) (42 U.S.C. 241(d))
- Family Educational Rights and Privacy Act (1974) (20 U.S.C. § 1232h, also 34 C.F.R. Part 99)
- AHRQ Confidentiality Provisions (42 U.S.C. §§299c-3(c),(d))
- CDC Confidentiality Provisions (42 U.S.C. § 242m(d)
- Patient Safety and Quality Improvement Act of 2005 (42 U.S.C. 299b-21 to 299b-26, also, 42 C.F.R. Part 3)
- The Patriot Act (109 P.L. 177)

13.10 Strategies and Operational Details

13.10.1 Seek Clarification on Territory Code Provisions.

Guam will request a legal opinion from the appropriate Territory attorney asking for clarification regarding the following:

Whether a patient seeking mental health services can, on their own (without the approval of their mental health professional), provide consent to release their health information from records pertaining to mental health treatment under Guam Code Annotated, Title 10, Chapter 82, §82605.

Whether the “approval” described in § 82605(b) of the Guam Code Annotated, Title 10, Chapter 82, must it be in writing and if so, what is required for a valid consent.

Whether the confidentiality provisions under § 80114 of the Guam Code Annotated, Title 10, Chapter 82 apply to medical records created and maintained by health care providers and entities outside of the Guam Memorial Hospital Authority, and if not, whether there of are similar confidentiality requirements under other sections of the Guam Code Annotated that apply to patient medical records created and maintained by health care professionals and entities outside of the Guam Memorial Hospital Authority.

13.10.2 Review and Analyze Federal Laws

Guam will identify, review and analyze relevant federal, state, and Territory privacy and security laws to determine any barriers or constraints to Health Information Exchange.

In performing this task, Guam will utilize any existing documents already addressing these issues including, but not limited to:

- Analysis, spreadsheets and/or PowerPoint presentations or other documents prepared by Territory attorneys.
- *Frequently Asked Questions, Applying the Substance Abuse Confidentiality Regulations to Health Information Exchange*, prepared by the Legal Action Center for the Substance Abuse and Mental Health Services Administration of the U.S. Department of Health and Human Services Administration;
- The Office of National Coordinator for Health Information Technology's, *Federal Privacy Laws Table;*
- The Office of National Coordinator for Health Information Technology's, Nationwide Privacy and Security Framework for Electronic Exchange of Individually Identifiable Health Information ; and
- Any other guidance documents developed by Office of National Coordinator for Health Information Technology;
- Considering the expertise needed to perform this task and given the time constraints, Guam may consider outsourcing this task to a consulting or legal firm with recognized expertise with these laws and regulations.

13.10.3 Review and Analyze Bordering State and Territory Laws

- Guam will review and analyze the privacy and security laws of states, Territories and independent states it intends to exchange PHI.
- Considering the expertise needed to perform this task and given the time constraints Guam may consider outsourcing this task to a consulting or legal firm with recognized expertise with these laws and regulations.
- Guam will attempt to establish relationships with their counterparts in governments where it intends to exchange PHI. Developing and maintaining these relationships is important because it will allow Guam to collaboratively develop processes for the electronic exchange PHI in common bordering areas.

13.10.4 Consider Making Changes to Guam Annotated Codes

After a review of Territory and Federal privacy and security laws, Guam may consider suggesting changes to the Guam Statues that would better effectuate the electronic exchange of health information while protecting the privacy and security of patient PHI. Considering the expertise needed to perform this task and given the time constraints Guam may consider outsourcing this task to a consulting or legal firm with recognized expertise in this area.

13.11 Policy Determinations

Guam has made the following legal and policy determinations related to Health Information Exchange.

13.11.1 Entity Participation in Guam Health Information Exchange

Active, robust participating in the Guam Health Information Exchange will improve the quality of health care provided to Guam citizens and those that receive health care in the Territory. Therefore, Guam will strongly encourage, but will not require, entities to

participate in the Guam Health Information Exchange. Requiring entities to participate may feel like an "unfunded mandate" to Guam health care providers.

13.11.2 Data Uses

In order to encourage use and trust in the Health Information Exchange, Guam will limit the initial use and disclosure of data in the Health Information Exchange to treatment and continuity of care purposes. As the Health Information Exchange is used more and security and privacy can be demonstrated, Guam will consider expanding uses and disclosures of PHI in the Guam Health Information Exchange to potentially include public health reporting and surveillance, quality measure reporting, research, and law enforcement.

13.11.3 Right to Opt out of Guam Health Information Exchange

In order to initially include a large number of individuals in the Health Information Exchange, Guam will adopt a process whereby patient PHI is automatically transferred or otherwise included in the exchange. However, patients will subsequently be given the right to opt-out of the Health Information Exchange upon written notification to any participating entity. Patients who opt out of the Health Information Exchange will need to understand that none of their health information will be available for use by health care providers accessing and utilizing the Guam Health Information Exchange. The Guam Health Information Exchange will offer patients the right to opt back into the exchange.

Federal law permits individuals to request restrictions on how their PHI is used and/or disclosed (see discussion under Section 6.6 below). The Guam Health Information Exchange will allow patients to request restrictions on how their PHI is used and disclosed, but will limit the request for restriction to only what is required by law because placing restrictions on PHI is technologically challenging and increases the risk that the PHI will be inappropriately used and/or accessed.

13.11.4 Oversight

According to Executive Order 2009-12 the Guam e-Health Collaboration will have oversight responsibility for the health information exchange. Oversight will include ensuring the development, implementation, monitoring, and enforcement of policies, procedures, forms and agreements. The GeHC will develop a subcommittee whose responsibility it will be to determine measures for failure to comply with established policies, procedures, forms and Agreements.

14.0 Guam Operational Plan

14.1 Introduction to Operational Plan

The following section describes the overall milestones, timeline for the core activities and associated tasks/subtasks to achieve goals and objectives outlined in the Territory of Guam's HIE strategic plan for statewide HIE.

The Guam HIE Strategic Plan will be implemented through this Operational Plan that outlines a corresponding and comprehensive set of activities to achieve the goals of the Strategic Plan. Execution of this plan will enable and support Guam's providers in achieving and demonstrating the meaningful use of EHR technology to improve patient care and safety through the enhanced delivery, quality and value of health care.

The initial Operational Plan will be continually evaluated and revised to reflect lessons learned during the implementation in order to achieve initial goals and objectives as well as newly identified goals and objectives.

The Guam eHealth Collaborative (GeHC) has been identified as the leadership organization to implement health information exchange in Guam. GeHC will provide the leadership to determine the path and optimize the model for exchange of health information in Guam, with the surrounding territories, Hawaii and the US mainland. As such, GeHC will serve as the governing body for Guam's HIE initiative.

The Territory of Guam through GeHC, will continue its practice of sharing information and coordinating with the HIE efforts of other Territories and States, in addition to supporting the NHIN Exchange initiatives to coordinate the development and interoperability of HIE initiatives across the nation. Coordination with others through the NHIN Exchange is included in this Operational Plan.

This Operational Plan covers topics as follows:

- Coordination with Other ARRA Programs
- Coordination with Medicaid
- Coordination with Other States
- Additional Environmental Scan Requirements
- Project Timeline
- Risk Mitigation
- Governance
- Communications
- Coordination with National-level and State-level HIT Programs
- Finance
- Technical Infrastructure
- Business and Technical Operations
- Legal and Policy

14.2 Coordination with Other ARRA Programs

The Territory of Guam has expressed a keen desire to coordinate the multitude of healthcare related project initiatives under the auspices of the HIE Implementation project. This project will be the essential enabler for assisting practitioners demonstrate Meaningful Use of Health IT. Connecting to federal agencies is also an important consideration addressed in the Operational Plan. Federal agencies, CMS for example, will require information exchange for initiatives like PQRI quality reporting. Connecting to federal agencies to exchange health information will be facilitated over NHIN.

14.2.1 Regional Extension Centers

GeHC is attempting to contact and work with TIPC, the Regional Extension Center for Guam. While TIPC has not yet made a vsisit to Guam, GeHC will make every effort to utilize their services and help providers find and use EHR technology. The State HIT Director is well positioned to coordinate and integrate the activities of TIPC into the Operational Plan for Guam.

14.2.2 Workforce Development

There is no workforce development program approved for Guam. It is the intent of GeHC to reach out to the Western states to connect with a workforce development program.

14.2.3 Broadband

The State of Guam is well connected and continuing to expand its broadband connectivity.

14.2.4 Beacon Community Grants

There are no Beacon Community Grants in Guam.

14.3 Coordination with Medicaid Incentive Payments Program

The Medicaid Bureau is currently applying for their State Medicaid Health Information Technology Plan (SMHP), as described in Section 4 above. Once funding Is approved and the SMHP is completed, Medicaid will have a clearer picture of the activities they will need to accomplish in preparation for the Medicaid Incentive Program. Some of the anticipated activities include:

- Coordination with GeHC to use existing HIT infrastructure when and where possible
- Creation of a Medicaid HIT webpage to provide information about the incentive program
- Coordination with the National Level Repository to create a current provider list for Guam
- Presentations about the EHR Provider Incentive Payment Program to:
  - Legislators
  - Eligible professionals and hospitals through their professional organizations
- Coordination with the Regional Extension Center for dissemination of incentive program information to providers
- Disseminated information about CMS webinars and calls available to providers on the EHR Provider Incentive Payment Program
- Follow the approved SMHP to ensure all eligible Medicaid providers receive qualified payments

- Continue to coordinate with the State HIT Director, the Regional Extension Center and Medicaid providers to disseminate information about the program
- Work with Medicaid providers, as described in the SMHP, and assist them meet Meaningful Use requirements

14.4 Coordination with Other States

Guam will continue its coordination efforts with other states as described in Section 8 above. These efforts will include:

- Initiate contact with other territories to seek opportunities for collaboration including:
  - American Samoa
  - Northern Marinas Islands (NMI)
  - Hawaii
- Discuss with ONC the need to create an "Asian Gateway" in order to facilitate the exchange of healthcare information with the Philippines and other Asian countries
- Continue to participate in national meetings related to HIE, Medicaid, and the REC's and hosted by:
  - Office of the National coordinator
  - National Governors Association
  - Health Information Management Systems Society
  - Others as deemed appropriate by the State HIT Director

14.5 Additional Environmental Scan Requirements

14.5.1 Investment of Federal Funds for Stage 1 Meaningful Use

The Territory of Guam received a federal grant of $1.6 Million to build their HIE. The territory has invested approximately $200,000 in Strategic and Operational Planning to date. The remainder of the funds will be allocated to the building on the HIE as shown in Section 14.6.2.4 below. It is estimated that this amount of funding is sufficient to build the HIE as described in the Strategic and Operational Plan. The expenditure of the remaining funds is estimated to be as follows:

Guam Health Information Exchange	$ 1,000,000
Interstate NHIN connections	$ 300,000
Consulting Assistance	$ 500,000
Total Estimated Expenditures	$ 1,800,000

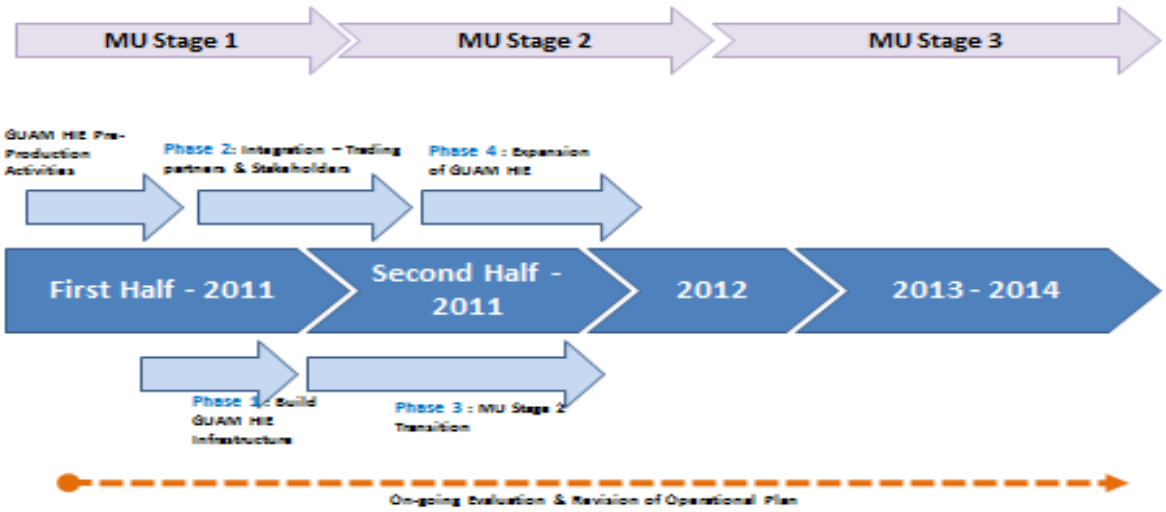
This will put GeHC in a position to meet all Stage 1 Meaningful Use requirements for providers across the state. In addition, it will position the territory for Stage 2 and 3 Meaningful Use when they become better defined.

14.5.2 Project Timeline

GeHC will build the statewide HIE by achieving the goals and objectives outlined in the four phases described in Figure 10 below. This operational plan will be executed by the following major principles:

- Initial efforts for building the HIE is agreed to among stakeholders and costs will be shared across stakeholder interests to make the HIE sustainable
- HIE Implementation is incremental to ensure that HIE capacity grows seamlessly
- This Operational Plan is flexible to reflect newly found requirements and lessons learned during the implementation. Ongoing evaluation and revision of the plan is required and planned.
- Every effort and activity is well documented and reviewed by stakeholders regularly and is open to any interested entities for valuable feedback and comments
- On-going assessment is conducted to measure the effectiveness and usefulness of value-added HIE services
- HIE implementation is aligned with other federal-level and state-level programs
- HIE implementation is aligned with the Meaningful Use stages

Figure 10 - High Level Guam Operational Time Line



The table below describes the work activities for each phase of the project.

Table 12 – HIE Implementation Phasing

Phases	Description	MU Alignment
Preliminary Phase	During this phase of a project, crucial preliminary data sources and human resources are identified. Initial high level organizational and technical structures are finalized and key components allocated to fit those structural components. Additionally, key stakeholders and project champions are identified and consulted to clearly map out their level of support, interaction and involvement. This Phase is crucial to the overall success of a project as it sets the tone and expectations of the final outcomes	MU Stage 1
Phase 0 Build Statewide HIE Infrastructure	This initial phase is pre-launch, hence the "zero" reference. In a similar vein to the preliminary stage, this is where the technical infrastructure is clarified, the overall design is developed and subsequently installed. It is worth noting that there is overlap between the phases to maximize efficiency in a tight time frame. This further serves to minimize exposure to risk due to unmet deadlines. While adhering to deadlines is highly desirable, a slight over-run in one phase will not cause a halt to the launch of the next phase	MU Stage 1
Phase 1 Integration – trading partners and stakeholders	For the Territory of Guam, Phase 1 of the HIE implementation will focus primarily on the integration of key stakeholders and initial partners. This phase will also set the ground work for meeting Meaningful Use requirements in alignment with Federal direction.	MU Stage 2
Phase 2 Integration – trading partners and stakeholders	During Phase 2, the HIE network expands connectivity to beyond the initial partners to other clinics, state agencies, NHIN, federal agencies and neighboring territories HIEs.	MU Stage 2
Phase 3 MU Stage 2 Transition	In Phase 3, the next stage of Meaningful Use will be transitioned into the statewide HIE. In this phase, GeHC will add additional sets of services and systems to address Meaningful Use stage 2 requirements. Phase 2 will still continue to expand further across the Guam landscape	MU Stage 2
Phase 4	The focus of this phase will be expansion of HIE capacity to	TBD

Expansion of Statewide HIE	cover a vast array of clinics and Physicians. More connections will be added to the statewide HIE network with the goal of making connections to all providers in the state.	

The Project Schedule detailed below describes the tasks and subtasks that will be completed over the next four years to enable and implement the GeHC.

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ID	Task Name	Duration	Start	Finish	Prede
1	**Guam HIE Strategic & Operational Plan Deployment**	**346 days**	**11/19/2010**	**3/16/2012**	
2	**Coordinate with Guam Territory Teams**	**266 days**	**11/19/2010**	**11/25/2011**	
3	**Provider Outreach and Meaningful Use Training**	**255 days**	**12/6/2010**	**11/25/2011**	
4	Meaningful Use Planning	15 days	12/6/2010	12/24/2010	
5	Meaningful Use Training	240 days	12/27/2010	11/25/2011	4
6	Coordinate with Communication Team	240 days	12/27/2010	11/25/2011	4
7	Coordinate with Training Team	240 days	12/27/2010	11/25/2011	4
8	Provider E.H.R. Education	240 days	12/27/2010	11/25/2011	4
9	Territory Provider Outreach	240 days	12/27/2010	11/25/2011	4
10	**Work With Guam Legislature**	**241 days**	**11/19/2010**	**10/21/2011**	
23	**Coordinate with Medicaid**	**241 days**	**11/19/2010**	**10/21/2011**	
36	**Cordinate with Medicare**	**241 days**	**11/19/2010**	**10/21/2011**	
49	**Monthly Update Meetings with Guam HIE**	**182 days**	**2/14/2011**	**10/25/2011**	**105**
63	**Guam HIE Program Reporting**	**270 days**	**1/10/2011**	**1/20/2012**	
64	**Submit ARRA Reports Quarterly**	**261 days**	**1/21/2011**	**1/20/2012**	
70	**Submit Financial Status Reports Quarterly to ONC**	**261 days**	**1/21/2011**	**1/20/2012**	
76	**Submit ONC Program Progress Reports Semi-Annually**	**261 days**	**1/21/2011**	**1/20/2012**	
80	**Participation / Data Use Agreements (DURSA)**	**13 days**	**1/10/2011**	**1/26/2011**	
85	**Communications Plan**	**36 days**	**1/27/2011**	**3/17/2011**	**84**
94	**Territory-wide HIE Preliminary Planning**	**45 days**	**1/3/2011**	**3/4/2011**	
95	**Update Strategic & Operational Plan per Guam Requirements**	**30 days**	**1/3/2011**	**2/11/2011**	
96	Update Governance Requirements	1 wk	1/3/2011	1/7/2011	
97	Update Finance Requirements	1 wk	1/3/2011	1/7/2011	
98	Update Technical Infratructure Requirements	1 wk	1/3/2011	1/7/2011	
99	Update Business & Technical Operations Requirements	1 wk	1/3/2011	1/7/2011	
100	Update Legal Policy Requirements	1 wk	1/3/2011	1/7/2011	
101	Align with Guam Cancer Surveillance Plan	2 wks	1/10/2011	1/21/2011	100
102	Align Guam Medicaid HIT Plan with Guam HIE Plan	2 wks	1/10/2011	1/21/2011	100

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ID	Task Name	Duration	Start	Finish	Prede
103	Align Guam Public Health Requirements with State HIE Plan	2 wks	1/10/2011	1/21/2011	100
104	Consolidate Teritory-wide HIE Strategic & Operational Plan with HIE Business Plan	2 wks	1/24/2011	2/4/2011	103
105	Obtain Endorsement of Strategic & Operational Plan from HIE Board & Shareholders	1 wk	2/7/2011	2/11/2011	104
106	**Complete Environmental Scan of Existing Assets**	**40 days**	**1/10/2011**	**3/4/2011**	**96**
107	Evaluate Existing HIE Assets	30 days	1/10/2011	2/18/2011	
108	Evaluate Territory Department Assets	30 days	1/10/2011	2/18/2011	
109	Evaluate HIE Participant Assets	30 days	1/10/2011	2/18/2011	
110	**Guam API Interface Development**	**40 days**	**1/10/2011**	**3/4/2011**	
111	**Environmental Scan to determine current status**	**15 days**	**1/10/2011**	**1/28/2011**	
112	Immunization Processes and connectivity	5 days	1/10/2011	1/14/2011	
113	MEDICAID Processes and Connectivity	5 days	1/17/2011	1/21/2011	112
114	Syndromic Surveillance Processes	5 days	1/24/2011	1/28/2011	113
115	**Develop API Solutions**	**25 days**	**1/31/2011**	**3/4/2011**	**114**
116	Determine Future processes	5 days	1/31/2011	2/4/2011	
117	Develop Integration Solutions	15 days	2/7/2011	2/25/2011	116
118	Coordinate with Territory entities for deployment	5 days	2/28/2011	3/4/2011	117
119	**Phase 0: Guam HIE Program Meetings & Training**	**20 days**	**2/15/2011**	**3/14/2011**	
120	Attend Kick-Off Summit & Leadership Training	1 day	2/15/2011	2/15/2011	62
121	**Phase 0: HIE Pre-Production Activities**	**20 days**	**2/15/2011**	**3/14/2011**	
122	Complete Privacy & Security Policies	2 wks	2/15/2011	2/28/2011	62
123	Develop Patient - Opt Out Policies & procedures	2 wks	2/15/2011	2/28/2011	62
124	Obtain HIE Security Certification	2 wks	2/15/2011	2/28/2011	62
125	Comply with Standards to Support Meaningful Use	2 wks	2/15/2011	2/28/2011	62
126	Develop Process to Capture HIE Status & Metrics	2 wks	3/1/2011	3/14/2011	125
127	**Phase 1: Upgrade Guam HIE Infrastructure**	**140 days**	**12/27/2010**	**7/8/2011**	

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ID	Task Name	Duration	Start	Finish	Prede
128	Upgrade HIE Servers -- Hardware	6 wks	12/27/2010	2/4/2011	4
129	Upgrade HIE Servers -- Software	2 wks	2/7/2011	2/18/2011	128
130	Upgrade HIE Servers -- Licenses	1 wk	2/7/2011	2/11/2011	128
131	Integrate Single - Sign On Capabilities	3 wks	2/7/2011	2/25/2011	128
132	Coordinate API Deployment	2 wks	3/7/2011	3/18/2011	118
133	**Provider Adoption**	**45 days**	**2/16/2011**	**4/19/2011**	**120**
134	Identify Team to Meet with Providers	5 days	2/16/2011	2/22/2011	4
135	Survey Providers for Adoption Criteria	30 days	2/23/2011	4/5/2011	134
136	Incorporate Provider Feedback into Operation Plan	10 days	4/6/2011	4/19/2011	135
137	**Install Guam Territory HIE (Grid Server)**	**110 days**	**2/7/2011**	**7/8/2011**	
138	Install Federated hybrid Servers at TYCO Data Center (Guam)	15 days	2/7/2011	2/25/2011	128
139	Review Meaningful Use for Updated Applications	10 days	2/28/2011	3/11/2011	138
140	Install HIE Applications Onto Guam HIE Servers	45 days	3/14/2011	5/13/2011	139
141	Test Identified Applications	30 days	5/16/2011	6/24/2011	140
142	Install NHIN HIE CONNECT Gateway	5 days	6/27/2011	7/1/2011	141
143	Install FIM / SSO / RBAC Privacy System	5 days	7/4/2011	7/8/2011	142
144	**Phase 2: Provider Integration -- Trading Partners & Stakeholders**	**290 days**	**2/7/2011**	**3/16/2012**	
145	**Install Edge Servers**	**290 days**	**2/7/2011**	**3/16/2012**	
146	**Edge Server 1: Guam Memorial Hospital**	**50 days**	**2/7/2011**	**4/15/2011**	
147	Network Subscription Agreement Review & Signature	1 wk	2/7/2011	2/11/2011	128
148	Interface Requirements Gathering	1 wk	2/14/2011	2/18/2011	147
149	Integration Planning	2 wks	2/21/2011	3/4/2011	148
150	API Interface Development (Test, Validate, Go Live)	3 wks	3/7/2011	3/25/2011	149
151	Install On Site Edge Server	1 wk	3/28/2011	4/1/2011	150
152	Install Clinical Interfaces	1 wk	4/4/2011	4/8/2011	151
153	Install HIE Gateway Interfaces	1 wk	4/11/2011	4/15/2011	152
154	End User Training	1 day	4/11/2011	4/11/2011	152
155	Site Go Live	1 day	4/12/2011	4/12/2011	154
156	**Edge Server 2: Seventh Day Adventist Clinic**	**52 days**	**4/4/2011**	**6/14/2011**	
157	Network Subscription Agreement Review & Signature	1 wk	4/4/2011	4/8/2011	151

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ID	Task Name	Duration	Start	Finish	Prede
158	Interface Requirements Gathering	1 wk	4/11/2011	4/15/2011	157
159	Integration Planning	2 wks	4/18/2011	4/29/2011	158
160	API Interface Development (Test, Validate, Go Live)	3 wks	5/2/2011	5/20/2011	159
161	Install On Site Edge Server	1 wk	5/23/2011	5/27/2011	160
162	Install Clinical Interfaces	1 wk	5/30/2011	6/3/2011	161
163	Install HIE Gateway Interfaces	1 wk	6/6/2011	6/10/2011	162
164	End User Training	1 day	6/13/2011	6/13/2011	163
165	Site Go Live	1 day	6/14/2011	6/14/2011	164
166	**Edge Server 3: DLS Labs**	**50 days**	**5/30/2011**	**8/5/2011**	
176	**Edge Server 4: Guam Radiology Associates (Dr. Berg)**	**50 days**	**7/25/2011**	**9/30/2011**	
186	**Edge Server 5: Health Services of the Pacific**	**50 days**	**9/19/2011**	**11/25/2011**	
196	**Edge Server 6: Territory of Guam Clinics (RPMS EMR)**	**50 days**	**11/14/2011**	**1/20/2012**	
206	**Edge Server 7: Territory of Guam Medicaid & Public Health**	**50 days**	**1/9/2012**	**3/16/2012**	
216	**End of Phase HIE Status Update**	**14 days**	**1/16/2012**	**2/2/2012**	
217	Evaluate Project Plan	5 days	1/16/2012	1/20/2012	207
218	Evaluate Risk Assessment Strategy	5 days	1/23/2012	1/27/2012	217
219	Report to HIE Oversite Committee	1 day	1/30/2012	1/30/2012	218
220	Adust Project Plan (If Needed)	3 days	1/31/2012	2/2/2012	219
221	Adjust Risk Mitigation Plan (If Needed)	3 days	1/31/2012	2/2/2012	219
222	**Phase 3: Meaningful Use Stage 2 Transition**	**50 days**	**7/25/2011**	**9/30/2011**	
223	Revisit Meaningful Use with Guam HIE Board	1 wk	7/25/2011	7/29/2011	171
224	Upgrade Gateway Service Modules	2 wks	8/1/2011	8/12/2011	223
225	Market & Promote Enhanced Meaningful Use Modules	1 wk	8/15/2011	8/19/2011	224
226	Integrate New Modules into End User Training	4 wks	8/22/2011	9/16/2011	225
227	Promote New Module Integrated Network Services	1 wk	9/19/2011	9/23/2011	226
228	Evaluate HIE Exchange Performance and Functionality	10 days	9/19/2011	9/30/2011	226
229	**Phase 4: Territory Wide HIE Expansion**	**145 days**	**5/30/2011**	**12/16/2011**	
230	**Edge Server 8: Payor 1**	**26 days**	**5/30/2011**	**7/4/2011**	
235	**Edge Server 9: Payor 2**	**26 days**	**6/20/2011**	**7/25/2011**	
240	**Edge Server 10: Payor 3**	**26 days**	**7/11/2011**	**8/15/2011**	

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ID	Task Name	Duration	Start	Finish	Prede
245	**Edge Server 11: Payor 4**	**26 days**	**8/1/2011**	**9/5/2011**	
250	**Edge Server 12: Lab Services**	**26 days**	**8/22/2011**	**9/26/2011**	
255	**Edge Server 13: Radiological Services**	**26 days**	**9/12/2011**	**10/17/2011**	
260	**Edge Server 14: Guam Provider**	**26 days**	**10/3/2011**	**11/7/2011**	
265	**Edge Server 15: Guam Provider**	**26 days**	**10/24/2011**	**11/28/2011**	
270	**End of Phase HIE Status Update**	**14 days**	**11/29/2011**	**12/16/2011**	

14.6 Required Funding

As shown in Section 14.6.2.4 and .5 below, detailed funding requirements for both capital and operating expenses are shown. Guam is in the formative stages of building the HIE and is just now engaging stakeholders in the process. Early indications are positive and it is anticipated that the major stakeholders will participate in the HIE. The funding plan shown in this document is based on the discussions to date and anticipate the required funding will be available.

14.6.1 Medicaid Role

Medicaid is a key participant in building the GEHC. They are a major user as well as a major funder. Initial discussions have already been held with the Medicaid HIT coordinator. Plans for working collaboratively with the state HIT Director are currently in place and are being implemented. At the time of submission of this plan, the following steps have been agreed upon:

- Collaboratively work to define Medicaid's fair and reasonable portion of the expense of building and operating the GEHC
- Submit an amended I-APD requesting the necessary funding with the required supporting documentation
- Work jointly to present the funding requirements to the Guam State Legislature and secure their support
- Connect Medicaid the GEHC as early as possible in order to maximize the benefits of health information exchange

14.7 ONC Required Support

Continual and ongoing guidance, information sharing and multi-state meetings to discuss and review evolving knowledge, and responding to the expressed needs of the various states.

14.8 Environmental Scan Gap Strategies

The Environmental Scan work to date has been thorough but additional work is required to identify provider requirements at a more detailed level. GeHC has identified the following strategies to expand the Environmental Scan work to immediately provide additional data and information for the anticipated RFP process:

- Establish a plan to gather the necessary additional details required at the individual provider level (October 2010)
- Form the Domain Teams and begin the process of designing the operational components of the HIE including:
  - Governance structure
  - Financial sustainability
  - Business and technical operations
  - Legal and Policy refinement
  - Provider adoption
  - Clinical support
  - Communication and Education

- Conduct additional data gathering across Guam to gather the essential information for the design of the HIE (November 2010)
- Use the information to architecture and design the HIE(December (2010)
- Begin construction of the HIE (January2011)
- Continue working with the Domain Teams and GeHC to build the operational structure to begin operations

14.9 Project Management Plan

14.9.1 Project Management Approach

The Institute of Electrical and Electronics Engineers (IEEE) Standard 1490-2003 adoption of the PMI's Project Management Body of Knowledge defines project management as "the application of knowledge, skills, tools, and techniques to project activities to meet project requirements." In other words, project management encompasses the standards, processes, procedures, and supporting tools necessary to plan, monitor, and execute project life cycle phases. In addition, project management goes beyond managing the daily activities of the project team. It involves monitoring and communicating the project status, ensuring the timeliness and quality of deliverables and identifying and resolving issues before the project is affected.

The HIT Director shall ensure an information cross flow between the stakeholders. He shall operate as the project manager be responsible for overseeing the work of the HIE implementation and shall follow these four basic project management objectives:

- High-Quality Work: Deliver a high quality project that addresses GeHC business objectives and meets stakeholder requirements
- On-Time Delivery: Complete deliverables on schedule and within budget
- Effective Communication: Timely and accurate communication to project participants and stakeholders throughout the entire project
- Proactive Management: Identify potential problems before they develop, and initiate appropriate corrective action

The Project Management Body Of Knowledge (PMBOK) is widely accepted as a standard for the project management profession. The PMBOK provides a framework encompassing all aspects of project management and represents generally accepted best practices. GeHC will utilize PMBOK as a guide to strong project management as the HIE is constructed and begins operations..

14.9.2 Risk Mitigation

Table 13 – Identified Risks and Mitigation Plan

Identified Risk	Mitigation Plan
10.4.1 Adoption Risks	
1. One of the key stakeholders doesn't join HIE	A. Revise the financial sustainability plan
	B. Seek additional collaborative from other Pacific entity participants
	C. Scale back on the size of the HIE
2. Setting achievable expectations	A. Build solutions from existing architectures and software

	B. Base statewide roll-out on implementation pilot
	C. Review expectations with vendors, stakeholders and state agencies
	D. Review technological capabilities of provider locations
	E. Review and, if necessary, revise implementation timeline
3. GeHC fails to address stakeholder inquiries	A. Schedule additional stakeholder meetings with key implementers
	B. Revise stakeholder and provider support process
4. Operating Costs are Unsustainable	A. Delay timeline for implementation of new technology
	B. Renegotiate on-going rates for HIE services with HIE vendor
	C. Revise the financial sustainability plan
	D. Seek additional funding sources such as grants
10.4.2 Political Risks	
1. Insufficient legislative support and financing	A. Appeal to State Agencies and stakeholders within state
	B. Schedule stakeholder meetings to review legislative process
	C. Seek additional funding sources such as grants
2. Resistance from lobbyists	A. Appeal to State Agencies and stakeholders within Guam
	B. Schedule stakeholder meetings with local decision makers, politicians and influencers
	C. Appeal to CMS for support and information
	D. Appeal to the ONC for support and information
3. Resistance from State Agencies	A. Appeal to stakeholders within state
	B. Revise strategic & operational plans to address needs of state agencies
	C. Appeal to CMS for authority and support
	D. Appeal to the ONC for authority and support
4. Required legislative action around public policy issues	A. Schedule stakeholder meetings to review policy issues
	B. Schedule stakeholder meetings to review legislative process
5. Federal funding is lost or delayed causing the population to receive poor healthcare	1. Ensure the Strategic and Operational plan is accepted and approved 2. Work with the Guam delegate to Congress to help acquaint federal agencies with Guam needs
10.4.3 Business Plan/Financial Risks	
1. Failure to follow SOP	A. Set firm project milestones based on SOP timelines
2. Inability of stakeholders to contribute to costs	A. Seek additional funding sources such as grants
	B. Delay timeline for implementation of new technology
10.4.4 Legal Risks	
1. Privacy & Security risks	A. Review HIPAA guidelines with operating organization

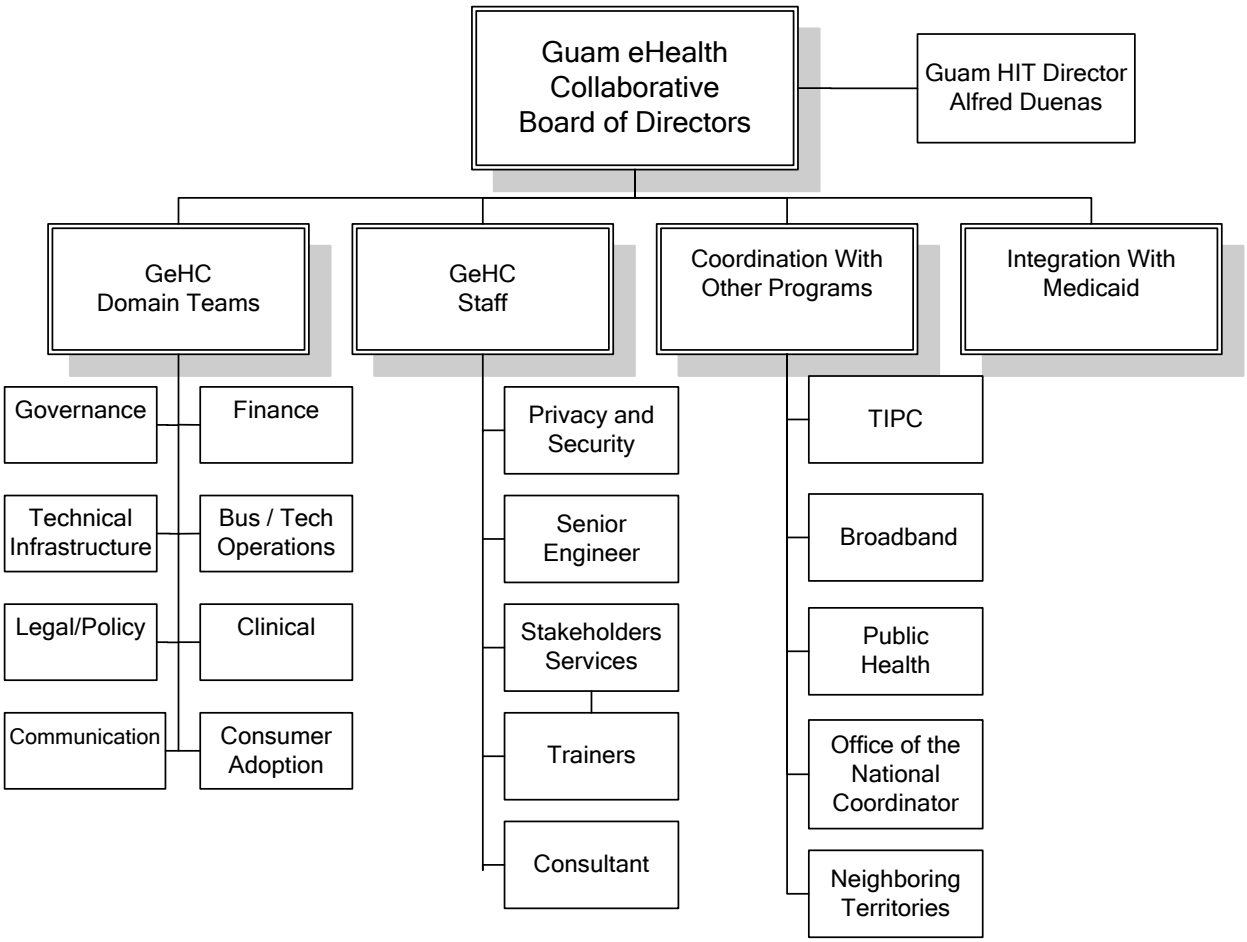
	B. Review HIPAA guidelines with HIE stakeholders
	C. Review HIPAA guidelines with key stakeholders and state agencies
	D. Review privacy and security technology options, revise strategic and operational plans to address risks
10.4.5 Technical Risks	
1. Unanticipated ONC requirements	A. Review ONC requirements with respect to existing plans and technology
	B. Revise Strategic and Operational Plans based on new requirements
	C. Delay timeline for implementation of technology outside of the requirements
2. Unanticipated CMS requirements	A. Review CMS requirements with respect to existing plans & technology
	B. Revise Strategic and Operational Plans based on new requirements
	C. Delay timeline for implementation of technology outside of the requirements
3. Maintaining up-to-date technical specifications and standards	A. Build technical infrastructure according to national standards
	B. Set maintenance and support plan to include updates for new specifications and standards
	C. Revise technical specifications according to quarterly NHIN updates
	D. Require adherence to standards from IHE, NHIN, and the incentive payment plan requirements
10.4.6 National Risks	
1. Failure of Medicare to participate with GeHC	A. Meet with Medicare decision makers to review interactions, use-cases and gain Medicare support
	B. Appeal to CMS with contact from stakeholders & state agencies
2. Failure of Medicare to share equitably in cost of GeHC	A. Request additional HIE funding from CMS
10.4.7 NHIN Risks	
1. Multiple NHIN connections and sustainability	A. Deploy one central NHIN connections within Guam
	B. Revise SOP to include NHIN gateways based purely on need, reduce number of NHIN connections to a minimum
2. Vendors to connect directly with NHIN	A. Revise state HIE technical infrastructure to be based on NHIN specifications and route communication through the NHIN-compliant state HIE
	B. Offer financial incentives for providers connecting to GeHC
	C. Address laws, mandates or other legislative requirements for providers joining the HIE

3. Using NHIN Direct if providers think it will address Meaningful Use needs	A. Revise statewide architecture to include NHIN direct
	B. Offer financial incentives for providers connecting to statewide HIE
	C. Address laws, mandates or other legislative requirements for providers joining the HIE
4. Educating providers about NHIN Exchange and NHIN Direct and its capabilities	A. Require NHIN outreach sessions
	B. Require NHIN educational sessions

14.10 Governance

14.10.1 Governance Structures

The structure for the Guam eHealth Collaborative (GeHC) is set forth in the Governors Executive Order. The governing body is the GeHC Board of Directors. In the following diagram, the overall structure for GeHC is shown.



14.10.2 Stakeholder Engagement and Representation

All stakeholders are represented in the organization chart shown above. GeHC has a broad representation of stakeholders and the Domain Teams are open to additional stakeholders. GeHC is working to bring more stakeholders into the process and get more involvement from providers. GeHC has added a Domain Team specifically for consumers so they are clearly represented as well.

14.10.3 Oversight

GeHC maintains oversight responsibility for all HIE activities in the Territory of Guam. They report to the Governor and deliver frequent reports. In addition, the Director of Public Health and Human Services oversees the HIE, Public Health and Medicaid. The HIT Director is specifically chartered to ensure GeHC is compliant with Guam laws and policies.

14.10.4 Policy Development

Policy development is a function of the GeHC Board of Directors. They will use the Domain Team structure as well as advice from various stakeholders in the development of all policy decisions. GeHC generally requires a majority of the total membership to approve all policy decisions.

14.10.5 Advisory Groups

As shown in the above chart, the GeHC Board of Directors has fifteen (15) diverse members. Domain Teams will provide advice and counsel to them on all issues. In addition, GeHC forms special advisory groups on an as needed basis to address specific issues of importance.

14.10.6 Coordination with Medicaid and Public Health

The Public Health and Human services Department head is responsible for the operations of Medicaid, Public Health and HIE. Therefore, coordination will be managed by a single resource reporting directly to the Governor.

14.11 Finance

14.11.1 Cost Estimates

Table 14 below describes the key items to be required for the implementation of Health Information Exchange.

Table 14 – Infrastructure Description

KEY			
Item Name	Description	One-Time Fees	Annual Fees
HIE Core Infrastructure	HIE Core Infrastructure - eMPI, Single Sign On with Identity Management Service, Record Locator Service, Patient Consent Management Service, Registries/Centralized Store of data Elements, Applications/support of Lab orders and results, e-Prescribing, Quality Reporting, Audit Logging/Reporting	License Fee and One-time installation Fee	Annual maintenance, support, patches, fixes, upgrades

EDGE Gateways	EDGE Gateways with Clinical Support of IHE Certified Systems (CCD)	One time license fee, installation and integration with IHE certified EHRs	EDGE Gateways for annual connectivity, support, maintenance, and support of applications/services
Standalone Lab Inteface (Orders/Results)	Stand alone lab interfaces with LIS - lab orders and results management with integrated clinical data support	Stand alone labs integration and installation	Maintenance, support, and ongoing connectivity
Physicians Portal Access	Physician portal access for - Includes Identity Management/Single Sign-On, State Services Access, e-Prescribing, Lab Orders/Results, Record Locator Services	Setup and training of physicians	Annual maintenance and upgrades
Integration of Existing Stakeholder Portal systems	Integration of 4 payers, 3 public health entities, lab and radiology portals into physician portal for single sign-on and single portal access to multiple stakeholders and systems	Integration of multiple stakeholder portals and systems – up to 10 stakeholders / systems	Maintenance and support
NHIN Gateway Connections	NHIN Gateway with external connections	One-time fees for license and setup	Annual maintenance and support
Integration with Medicaid and Territory Systems	Integration with Medicaid systems, Public Health Systems, API development, etc.	One time fees for license and setup	Annual maintenance and support
Hosting, Hardware, Etc.	Hosting, Hardware and Miscellaneous Fees	Hardware and software for main datacenter and redundant/failover datacenter	Annual maintenance and support

14.11.2 Staffing Plans

GeHC will be managed to a significant degree Bureau of Information Technology personnel responsible for installing and maintaining many of the components of the technical infrastructure. In addition, GeHC will need to employ the following positions, phased in over

time as shown in the pro-forma budget, to manage several of the ongoing operational aspects of the HIE. Shown below are descriptions of those positions that will be required.

Director

The Director provides overall leadership and responsibility for operations in all areas such as communications, finance, technology and policy. He will effectively coordinate, develop and execute business plans and fundraising efforts with the GeHC Board of Directors, and manage the day-to-day operations of the organization. The Director will manage relationships among the Board of Directors as well as local and national stakeholders. He will also oversee the coordination and integration of the State's Medicaid, Public Health programs, and other local, state and national-level efforts.

Privacy and Security Officer

The role of the Privacy and Security Officer includes ensuring compliance with privacy and security standards, assessing risk and vulnerability, and overall data security. He or She will initiate and oversee projects with significant impact to GeHC, including risk mitigation and policy development. The Privacy and Security Officer will work closely with the Territories legal counsel.

Senior Engineer/Data Management

The responsibility of the Senior Engineer and Data Management is for the development, maintenance and support for collecting, editing, processing, and distributing of data to meet the needs of the GeHC. He or she will design, develop and implement computerized data files and information systems. He or she will also present reports for staff and providers as well as track national HIE efforts. He or She will also monitor and manage the day-to-day operations of projects or programs, as well as develop and maintain project schedules, documentation and budgets.

Health Information Consultant and Training

In Section 10.10 of the Strategic Plan, a description of the revenue generating, value added services the HIE will offer stakeholders is described. In order to offer these services, staff members will be required to develop and provide these services. Staff will need to be employed to offer these services and will require competencies and skills to complete a client assessment, analyze data and information, prepare recommendations and reports, and present solutions to stakeholders. In addition, this position may also provide stakeholder training on HIE system and processes.

14.11.3 Controls and Reporting

GeHC will employ standard GAAP processes to fulfill its promise of openness and transparency in all financial activities. GeHC will also provide regular and frequent reports to stakeholders, consumers and legislators.

14.11.4 Pro-Forma Capital Budget

In the budget below, capital costs are presented for building the GeHC over the next four (4) years. Recognizing that the grant funds from the Cooperative Agreement

Program have an escalating match from the state (100% Federal Fiscal Year (FFY) 2010, 9-1 in FFY 2011, 7 to 3 in FFY 2012 and 3 – 7 in FFY 2013), the following budget shows the amount of funding commitment from the Territory of Guam to build the HIE. Consulting assistance for designing the governance and operational aspects is also shown for the first two years of operations.

	CY 2011	CY 2012
Revenue		
Cooperative Agreement	$ 1,158,885	$ 260,201
Territory of Guam	$ 114,615	$ 106,279
Medicaid	$ 141,500	$ 40,720
Total Revenue	$ 1,415,000	$ 407,200
	2011	2012
Expense		
Core Infrastructure	$ 195,000	$ 35,100
Edge Gateways	$ 375,000	$ 67,500
Lab Order Results	$ 110,000	$ 19,800
Physician Portal Access	$ 75,000	$ 25,000
NHIN Gateway	$ 100,000	$ 18,000
Integration with State Systems	$ 60,000	$ 10,800
Hosting, Hardware, etc	$ 20,000	$ 36,000
Testing and Integration Support	$ 80,000	$ 70,000
Consulting Assistance	$ 400,000	$ 125,000
Total Expense	$ 1,415,000	$ 407,200

14.11.5 Pro-Forma Operating Budget

GeHC will require operating fees to fund operations over time. Expenses will include ongoing maintenance and licensing fees, staff salaries and benefits, project management, and consulting assistance. Ongoing maintenance and licensing fees are based on the capital budget shown the Section above. Staff salaries and benefits are based on a phased-in approach to staff according to the increasing needs of the operations. Shown below is the pro-forma budget for the first four (4) years of operations.

- Budget Assumptions
  - HIE becomes operational by June 1, 2011
  - Revenue is received as per the strategic plan
  - Staffing ramps up over a three year period
    - 2011 – Director (Full Time); Privacy and Security (6 months)
    - 2012 – Move Privacy and Security to full time, add Senior Engineer/Data Management, and Consultant (6 months)
    - 2013 – All staff is full time

	CY 2011	CY 2012	CY 2013	CY 2014
Revenue				
Territory of Guam	$ -	$ -	$ -	$ -
Providers/Payers	$ 388,290	$ 456,715	$ 572,130	$ 528,120
Medicaid (Estimated at 30%)	$ 166,410	$ 195,735	$ 264,060	$ 264,060
Fees for Services	$ -	$ -	$ 44,010	$ 88,020
Total Revenue	$ 554,700	$ 652,450	$ 880,200	$ 880,200
	CY 2011	CY 2012	CY 2013	CY 2014
Expense				
Core Infrastructure	$ 35,100	$ 35,100	$ 35,100	$ 35,100
Edge Gateways	$ 67,500	$ 67,500	$ 67,500	$ 67,500
Lab Order Results	$ 19,800	$ 19,800	$ 19,800	$ 19,800
Physician Portal Access	$ 25,000	$ 25,000	$ 25,000	$ 25,000
NHIN Gateway	$ 18,000	$ 18,000	$ 18,000	$ 18,000
Integration with State Systems	$ 10,800	$ 10,800	$ 10,800	$ 10,800
Hosting, Hardware, etc	$ 36,000	$ 36,000	$ 36,000	$ 36,000
Administrative Expense	$ 50,000	$ 60,000	$ 70,000	$ 70,000
Staffing	$ 292,500	$ 380,250	$ 598,000	$ 598,000
Total Expense	$ 554,700	$ 652,450	$ 880,200	$ 880,200

14.12 Technical Infrastructure

14.12.1 Standards and Certifications

Meeting the meaningful use standards is a major objective in building a territory-wide HIE. As such, this Operational Plan illustrates the installation of the key components necessary for meeting the criteria set for by the ONC and CMS for Meaningful Use. The Department of Health and Human Services and the Office of the National Coordinator (ONC) for Health Information Technology (HIT) and Centers for Medicare and Medicaid Services (CMS) have recently released the Meaning Use (MU) final rule specifying the related initial set of standards, implementation specifications, and certification criteria for Electronic Health Record (EHR) technology with final Meaningful Use Stage 1 objectives and measures. GeHC identifies as a minimum set of services to be offered for the Stage 1 aligned with general and ambulatory/inpatient specific capabilities as specified in the Meaningful Use final rule.

- Electronic Prescribing Service Interoperability: Electronic generation and transmission of prescriptions and prescription related information from provider EHRs
- Laboratory Results Exchange Service: Electronic submission of laboratory test orders and receiving/displaying of laboratory test results
- Exchange of Patient Summary Record in the format of HL7 CDA Release 2, Continuity of Care Document (CCD)[9] with following minimum data elements:

[9] HITSP/C32 "Summary Documents Using HL7 CCD Component" as an implementation specification to be adopted

- Demographics
- Problem list
- Medication & Medication Allergy List
- Laboratory test results
- Procedures

GeHC will adhere to standards (described in the technical strategic plan in detail) adopted and recommended in the final rule:

- Vocabulary Standards
- Content Exchange Standards
- Transport Standards, and
- Privacy and Security Standards.

The recommendation would be to phase the project in correlation with the recommendations of meaningful use. Thus Phase One should include at a minimum:

- Electronic Prescribing service support via provider EHR with e-Prescribing modules
- Laboratory Results Exchange Service
- CCD exchange with minimal data elements to include:
  - Demographic information
  - Problems list
  - Medication and Allergies list
  - Lab Test Results
  - Procedures

14.12.2 Technical Architecture

Each phase described in the previous section is associated with a set of implementations. As shown in Figure 11 below, a suite of HIE-level core engines, subsystems, a HIE portal (along with set of HIE-level services), and a NHIN Gateway will be implemented based on the HIE system architecture and plan developed during the preliminary phase. During Phase 2, participating stakeholders and trading partners will be connected to the stateside HIE including but not limited to statewide hospitals, regional health organizations, payers, military bases, state agencies, state Medicaid program and interstate HIEs. During phase 3, The MS-HIN will review the stage 2 criteria for the meaningful use of EHR technology and will incorporate it into the operational plan. A set of new services and engines will be added to the existing HIE services to support stakeholders to get ready for the transition to the meaningful use stage 2. Finally, efforts will be made to expand the capacity by adding more connections to the MS-HIN and to make the it self-sustainable by phase 4.

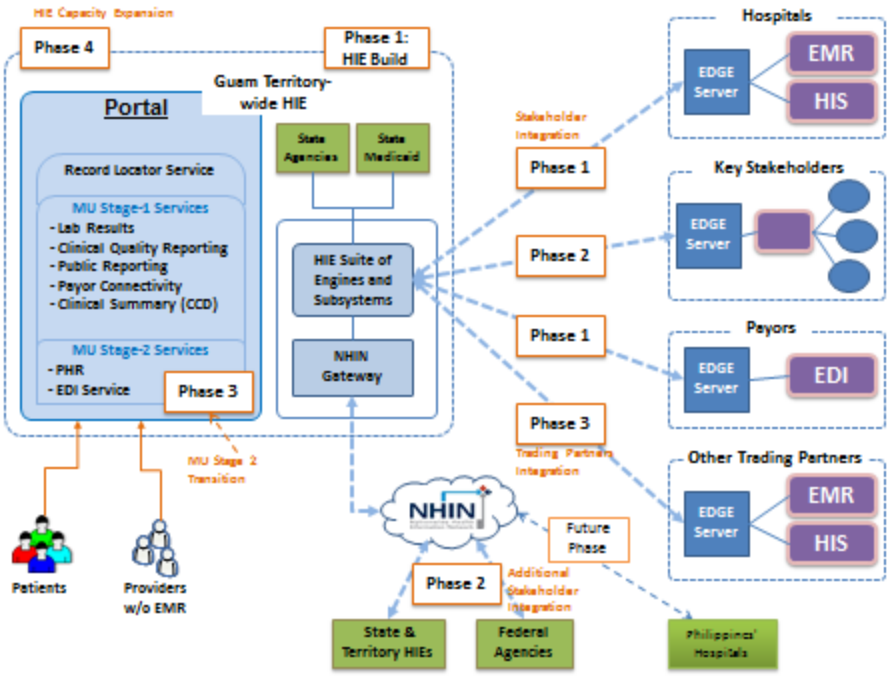


Figure 11: High level HIE architecture with phases

14.12.3 Technology Deployment

Operational Plans for HIE infrastructure and services will ensure the successful achievement of the goals including but not limited to:

- Leveraging of existing territorial level health information network
- Adherence to federal data exchange standards throughout planning
- Supporting meaning use of EHR technology and in the long run improving healthcare outcomes and qualities and building a self-sustainable health information exchange.

In order to achieve the goals described above, GeHC technical infrastructure will achieve the following objectives:

- Protection of Clinical Data requires
  - Certified secure data centers ensuring robust physical security of clinical data, hosted platforms, infrastructure, and applications
  - Encryption of data at rest
  - Secure transmission of health information data containing PHI by encryption and/or digital signature
  - Secure network – firewall and secure network infrastructure including introduction detection/prevention components
  - Well-planned policies and infrastructure for authorized access control – Role Based Access Control (RBAC)
  - Ensuring end-node security (hardware and software security) – computers, laptops and other mobile devices loosely connected to the HIE ➔ virus and malware prevention

    - Logging every auditable events
- Reliability and Disaster Recovery requires
    - Avoiding single point failures for high level reliability
    - Redundant hardware (clustering) and software deployment on one or more secure data centers – databases, software platforms (web servers, application servers, service containers to name a few), applications and etc
    - Regular Database backup on encrypted storages
    - A well planned disaster recovery plan
- Cost-efficient Scalability requires
    - HIE services and subsystem should be able to handle increasing users without significant increase of cost
    - The hardware and software infrastructure should be designed and built to easily and cost-effectively expand hardware resources (CPU, memory, hard disks etc) and software components
- Adoption of secure private cloud along with virtualization technology

14.13 Business and Technical Operations

Successful implementation of an HIE is in large part dependent on the actions of the stakeholders. The most critical step in obtaining stakeholder support is involvement and transparency from the beginning. Experience teaches us that this level of education is important to the implementation process whenever action is required at the stakeholder level.

As described earlier, the success of this project is dependent on the acceptance, adoption, and use of Electronic Health Records (EHRs) and HIT technologies and services by healthcare providers at all levels. Initial participants in an HIE implementation project should reflect the greatest cross-section of the Guam community, including:

- An array of user types including Guam Memorial Hospital, Urban and Rural Clinics, Critical Access Hospitals, Pharmacies and labs
- A variety of EMR systems including Surescripts, McKesson, Sage, and GE Centricity

14.14 Current HIE Capacities

The implementation plan for Guam will leverage the current capabilities of the health information technology network. Given the limited HIT infrastructure in Guam, most of the HIE will involve new construction. When and where possible, the existing infrastructure will be leveraged.

14.14.1 State-Level Shared Services

Guam Medicaid will begin work on a shared state services directory when the I-APD is approved for work. GeHC will work with Medicaid to create a providers repository to provide three basic functions:

- Assist with the ARRA stimulus funding program for Medicaid
- Assist TIPC in working with providers to obtain Medicare stimulus funds
- Provide a source for provider authentication and authorization for sharing healthcare data over the HIE

The provider registry, when fully developed, will be a key source of information to assist the HIE and other users of the HIE to have a reliable database for identifying providers in Guam.

14.14.2 Standard Operating Procedures

Once the architecture of the HIE is finalized, GeHC will work with the Business and Technical Domain Team to create a set of standard operating procedures. Agreement already exists for developing the standard operating procedures but until the architecture is known, work to create standard procedures will not begin. Once a clear direction is established, it will only take a short period of time to create the required procedures.

14.14.3 Training and Technical Assistance

Training is crucial to a successful implementation of Health Information Exchange. As discussed in Section 14.6.2, training will be included as a part of the consulting services offered to stakeholders. Having a staff member that can work with various stakeholders to train them on GeHC functions as well the uses of and procedures for utilizing the services is important. GeHC will create this position early in the building of the HIE so the selected person is well versed in how the GeHC is architected and how it operates. Only through early involvement with the HIE can the person be fully capable of addressing stakeholder concerns and training them on all operational procedures. In addition, this person will be key to helping create the standard operating procedures discussed above.

14.14.4 Disaster Recovery

Information stored in a single location is prone to disasters such as typhoons, which have caused severe damage to the entire island and the patient information stored therein. Medical records stored electronically in a single location are equally liable to be destroyed by disasters as paper medical records. Data should be backed-up at an alternative location in order to safeguard important information like medical records.

Disaster recovery can be ensured via data backup sites. There are a number of options for data backup, including a second database within the provider location. The advantage of backing-up data at the provider location is that information will continue to be owned, managed and administered by the provider's staff. The disadvantage of backing-up data at the provider location is the risk of having an entire geographic area destroyed by a disaster. In the case of a provider-location backup, both the original data and the backup would be at risk if a disaster strikes that area.

A data backup at a geographically disparate location (off-site) is the most secure and reliable plan for disaster recovery. Medical records can be backed up at a disparate location via datacenters, such as the hosted data center RackSpace.com. Data backup at an off-site location is accomplished by synchronizing a database at the datacenter with the database at the provider location that stores the original electronic medical records. Any change made to the original records at the provider location is mirrored at the synchronized backup site. A hosted, off-site datacenter provides convenient access to data via the Internet. This will allow providers to access and transfer their data from the datacenter back to the provider location in the event of a disaster.

Redundant servers are also often used to backup data for disaster recovery. A redundant server is essentially an identical copy of the information in the data center. Redundant servers protect against any electronic or technical failure at a datacenter and can be stored at disparate location (creating a third location where data is stored).

This Strategic and Operational Plan uses a central statewide data backup site, which can be purchased from a datacenter, located outside of Guam and made available to any provider in the Territory. This plan will create maximum security by storing information at each provider location, as well as, a central location. It is highly unlikely that two disparate locations, one being a provider location within Guam, the other being the off-island backup center, will be simultaneously compromised. If the Territory desires a third fail-over mechanism, redundant servers can be purchased.

In the event of a disaster, provider locations that lost their medical records would first need to establish a connection to the backup site. If the backup site is hosted on-line, then the provider will need to secure an Internet connection. The provider would then be able to connect to the backup site and transfer information from the backup site to the provider's database.

14.15 Legal and Policy

14.15.1 Establish Requirements

GeHC has carefully reviewed and analyzed its statutes and policies. In almost all instances, Guam statues closely follow HIPAA standards. The privacy and security framework is thoroughly discussed in section 13 above and the GeHC will use that framework to protect patient's privacy and maintain compliance with HIPAA.

14.15.2 Privacy and Security Harmonization

Guam will investigate laws with other Pacific US entities (Saipan, American Samoa, etc.) as well as Hawaii to harmonize privacy and security issues. GeHC will:

- Understand Guam laws as they relate to the exchange of healthcare data and information
- Develop and use common forms
- Develop and use common agreements

14.15.3 Noncompliance or Breach Process

GeHC will establish strict and certain procedures for dealing with breaches of or noncompliance with all standards including privacy and security. Clear and unambiguous standards for noncompliance will be established and maintained in accordance with current operating procedures. Standards and processes will be well published and made part of every staff persons training as well as all stakeholder training and education. Policies and procedures for noncompliance and breaches will be published widely so the public as a sense of privacy and security protection and the procedures will be a key element of all provider and consumer education programs.

14.15.4 Process for Securing Agreement

GeHC will use a three step process for secure agreement with all privacy and security matters. The process includes the following steps:

- Complete the strategies set forth in Section13 above
- Recommend to the Guam legislature, where appropriate, changes in current law that should be modified to harmonize with neighboring territories and/or federal statutes
- Recommend to various territory agencies, where appropriate, changes in Guam policies and procedures that should be modified to harmonize with neighboring states and/or federal statutes

In the case of securing stakeholder approval of various data sharing and business associate agreements, GeHC will rely on three primary activities. These activities include:

- Involvement of key stakeholders in the development of the various agreements and contracts so they reflect a consensus of opinion regarding major provisions of the documents
- Education of other stakeholders during the process so they may also have input into the creation of these agreements
- Adoption of common agreements and contracts for GeHC to reflect the best thinking of the collective participants and establish uniform standards across the state

Appendix A: CMS and ONC Final Rule Compliant

	Category	Certification Criteria	Description	Standards	HIE Stage 1
1	General	Drug-drug, drug-allergy interaction checks – Notifications	Automatically and electronically generate and indicate in real-time, notifications at the point of care for drug-drug and drug-allergy contraindications based on medication list, medication allergy list, and computerized provider order entry (CPOE)	N/A	√
2	General	Drug-drug, drug-allergy interaction checks – Adjustments	Provide certain users with the ability to adjust notifications provided for drug-drug and drug-allergy interaction checks.	N/A	√
3	General	Drug-formulary checks	Enable a user to electronically check if drugs are in a formulary or preferred drug list		√
4	General	Maintain up-to-date problem list	Enable a user to electronically record, modify, and retrieve a patient's problem list for longitudinal care	45 CFR 162.1002(a)(1) & SNOMED CT	√
5	General	Maintain active medication list.	Enable a user to electronically record, modify, and retrieve a patient's active medication list as well as medication history for longitudinal care	N/A	√
6	General	Maintain active medication allergy list	Enable a user to electronically record, modify, and retrieve a patient's active medication allergy list as well as medication allergy history for longitudinal care.		√

7	General	Record and chart vital signs – Vital Signs	Enable a user to electronically record, modify, and retrieve a patient's vital signs including, at a minimum, height, weight, and blood pressure		
8	General	Record and chart vital signs – Calculate body mass index	Automatically calculate and display body mass index (BMI) based on a patient's height and weight		
9	General	Record and chart vital signs – Plot and display growth charts	Plot and electronically display, upon request, growth charts for patients 2-20 years old.		
10	General	Incorporate laboratory test results--(1) Receive results	Electronically receive clinical laboratory test results in a structured format and display such results in human readable format		√
11	General	Incorporate laboratory test results–(2) Display test report information	Electronically display all the information for a test report	42 CFR 493.1291(c)(1) through (7)	√
12	General	Incorporate laboratory test results--(3) Incorporate results	Electronically attribute, associate, or link a laboratory test result to a laboratory order or patient record		√
13	General	General Patient Lists	Enable a user to electronically select, sort, retrieve, and		√

			generate lists of patients according to, at a minimum, the data elements included in: (1) Problem list; (2) Medication list; (3) Demographics; and (4) Laboratory test results.		
14	General	Medication reconciliation.	Enable a user to electronically compare two or more medication lists		√
15	General	Submission to immunization registries	Electronically record, modify, retrieve, and submit immunization information in accordance with: (1) The standard (and applicable implementation specifications) specified in §170.205(e)(1) or §170.205(e)(2); and (2) At a minimum, the version of the standard specified in §170.207(e).	[Content] HL7 2.3.1 or HL7 2.5.1 and [Vocabulary] HL7 Standard Code Set CVX	√ (if available)
16	General	Public health surveillance	Electronically record, modify, retrieve, and submit syndrome-based public health surveillance information in accordance with the standard (and applicable implementation specifications)	[Content] HL7 2.3.1 or HL7 2.5.1	√ (if available)
17	General	Patient-specific education resources	Enable a user to electronically identify and provide patient-specific education resources according to, at a minimum, the data elements included in the		

			patient's: problem list; medication list; and laboratory test results; as well as provide such resources to the patient		
18	General	Automated measure calculation	For each Meaningful Use objective with a percentage-based measure, electronically record the numerator and denominator and generate a report including the numerator, denominator, and resulting percentage associated with each applicable Meaningful Use measure		
19	General – Security and Privacy	Access control	Assign a unique name and/or number for identifying and tracking user identity and establish controls that permit only authorized users to access electronic health information		√
20	General – Security and Privacy	Emergency access	Permit authorized users (who are authorized for emergency situations) to access electronic health information during an emergency		√
21	General – Security and Privacy	Automatic log-off	Terminate an electronic session after a predetermined time of inactivity		√
22	General – Security and Privacy	Audit log (1)– Record actions	Record actions related to electronic health information		√
23	General – Security and Privacy	Audit log (2)– Generate Audit Log	Enable a user to generate an audit log for a specific time period and to sort entries in the audit log according to any of the elements specified in the standard at §170.210(b).		√

24	General – Security and Privacy	Integrity.	(1) Create a message (2) Verify upon receipt of electronically exchanged health information that such information has not been altered (3) Detection. Detect the alteration of audit logs	A hashing algorithm with a security strength equal to or greater than SHA-1	√
25	General – Security and Privacy	Authentication.	Verify that a person or entity seeking access to electronic health information is the one claimed and is authorized to access such information		√
26	General – Security and Privacy	General encryption	Encrypt and decrypt electronic health unless the Secretary determines that the use of such algorithm would pose a significant security risk for Certified EHR Technology	Any algorithm identified NIST (FIPS 140-2)	√
27	General – Security and Privacy	Encryption when exchanging electronic health information	Encrypt and decrypt electronic health information when exchanged	Any	√
28	General – Security and Privacy	Optional Accounting of disclosures	Record disclosures made for treatment, payment, and health care operations	45 CRF 164.501	√ (when required)
29	Ambulatory /Inpatient	Computerized provider order entry	Enable a user to electronically record, store, retrieve, and modify, at a minimum, the following order types:		

			(1) Medications; (2) Laboratory; and (3) Radiology/imaging.		
30	Ambulatory	Electronic prescribing	Enable a user to electronically generate and transmit prescriptions and prescription-related information	[Content] NCPDP v8.1 or NCPDP v10.6 [Vocabulary] RxNorm	√
31	Ambulatory /Inpatient	Record demographics	Enable a user to electronically record, modify, and retrieve patient demographic data including preferred language, gender, race, ethnicity, and date of birth. Enable race and ethnicity to be recorded		√
32	Ambulatory	Patient reminders	Enable a user to electronically generate a patient reminder list for preventive or follow-up care according to patient preferences based on, at a minimum, the data elements included in: (1) Problem list; (2) Medication list; (3) Medication allergy list; (4) Demographics; and (5) Laboratory test results.		
33	Ambulatory /Inpatient	Clinical decision support - (1) Implement rules	Implement automated, electronic clinical decision support rules (in addition to drug-drug and drug-allergy contraindication checking) based on the data elements included in: problem list; medication list; demographics;		

			and laboratory test results.		
34		Clinical decision support - (2) Notifications	Automatically and electronically generate and indicate in real-time, notifications and care suggestions based upon clinical decision support rules		
35	Ambulatory /Inpatient	Electronic copy of health information	Enable a user to create an electronic copy of a patient's clinical information, including, at a minimum, diagnostic test results, problem list, medication list, and medication allergy list in : (1) Human readable format; and (2) On electronic media or through some other electronic means	[Content] HL7 CDA Release 2, CCD or ASTM CCR	√
36	Inpatient	Electronic copy of discharge instructions	Enable a user to create an electronic copy of the discharge instructions for a patient, in human readable format, at the time of discharge on electronic media or through some other electronic means		
37	Ambulatory	Timely access	Enable a user to provide patients with online access to their clinical information, including, at a minimum, lab test results, problem list, medication list, and medication allergy list.		√
38	Ambulatory	Clinical summaries	Enable a user to provide clinical summaries to patients for each office visit that include, at a minimum, diagnostic test results, problem list, medication		√

			list, and medication allergy list. If the clinical summary is provided electronically it must be: (1) Provided in human readable format; and (2) Provided on electronic media or through some other electronic means		
39	Ambulatory /Inpatient	Exchange clinical information and patient summary record–(1) Electronically receive and display	Electronically receive and display a patient's summary record, from other providers and organizations including, at a minimum, diagnostic tests results, problem list, medication list, and medication allergy list. Upon receipt of a patient summary record formatted according to the alternative standard, display it in human readable format.	[Content] HL7 CDA Release 2, CCD or ASTM CCR	√
40	Ambulatory /Inpatient	Exchange clinical information and patient summary record–(1) Electronically transmit	Enable a user to electronically transmit a patient summary record to other providers and organizations including, at a minimum, diagnostic test results, problem list, medication list, and medication allergy list	[Content] HL7 CDA Release 2, CCD or ASTM CCR	√
41	Ambulatory /Inpatient	Calculate and submit clinical quality measures–(1) Calculate	(i)Electronically calculate all of the core clinical measures specified by CMS for eligible professionals. (ii) Electronically calculate, at a minimum, three clinical quality measures specified by CMS for eligible professionals, in		

			addition to those clinical quality measures		
42	Ambulatory /Inpatient	Calculate and submit clinical quality measures	Enable a user to electronically submit calculated clinical quality measures	CMS PQRI	
43	Inpatient	Reportable lab results	Electronically record, modify, retrieve, and submit reportable clinical lab results	[Content] HL7 2.5.1 [Vocabulary] LOINC v2.27	
44	Inpatient	Advance directives	Enable a user to electronically record whether a patient has an advance directive		

Appendix B: Healthcare Terminology

Term	Definition
Authentication	Authentication is a method or methods employed to prove that the person or entity accessing information has the proper authorization. Generally used to protect confidential information and network or application access.
Authorization	Authorization is a system established to grant access to information. Authorization also establishes the level of access an individual or entity has to a data set and includes a management component–an individual or individuals must be designated to authorize access and manage access once access is approved.
Broadband	A medium that can carry multiple signals, or channels of information, at the same time without interference. Broadband Internet connections enable high-resolution videoconferencing and other applications that require rapid, synchronous exchange of data.
Business Associate	A business associate is an agent of a health care organization, generally with access to individually identifiable health information, who assists the health care organization in conducting business. A business associate can also be a covered entity in its own right. This definition derives from business associate as defined in the Health Insurance Portability and Accountability Act (HIPAA) Security and Privacy Rules; the term is defined at 45 C.F.R. § 160.103.
Business Practices	Business practices are organizational actions or processes implemented to address the needs of the business in meeting organizational goals, legal requirements, the needs of customers (in health care, patients and health plan members) and remaining profitable.

Term	Definition
Computerized physician order entry (CPOE)	Computer-based systems that automate and standardize the clinical ordering process in order to eliminate illegible, incomplete, and confusing orders. CPOE systems typically require physicians to enter information into predefined fields by typing or making selections from on-screen menus. CPOE systems often incorporate, or integrate with, decision support systems.
Data repository	A database acting as an information storage facility. Although often used synonymously with data warehouse, a repository does not have the analysis or querying capabilities of a warehouse.
Data warehouse	A large database that stores information like a data repository but goes a step further, allowing users to access data to perform research-oriented analysis.
De-identified health information	De-identified health information consists of individual health records with data redacted or edited to prevent it from being associated with a specific individual. See the HIPAA Privacy Rule for de-identification guidelines. The term is defined at 45 C.F.R. § 160.103.
Domains	In this context, the term Domains refers to the five domains (Governance, Legal and Privacy, Technical Infrastructure, Finance, and Business and Technical) that are outlined by the Office of the National Coordinator.
e-Prescribing	Practice in which drug prescriptions are entered into an automated data entry system (handheld, PC, or other), rather than handwriting them on paper. The prescriptions can then be printed for the patient or sent to a pharmacy via the Internet or other electronic means.
Electronic Health Record (EHR)	An electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards that can be created, managed, and consulted by authorized clinicians and staff across more than one health care organization.

Term	Definition
Electronic Medical Record (EMR)	An electronic record of health-related information for an individual that can be created, gathered, managed, and consulted by authorized clinicians and staff within one health care organization.
Federal Health Architecture (FHA)	A collaborative body composed of several federal departments and agencies, including the Department of Health and Human Services (HHS), the Department of Homeland Security (DHS), the Department of Veterans Affairs (VA), the Environmental Protection Agency (EPA), the United States Department of Agriculture (USDA), the Department of Defense (DOD), and the Department of Energy (DOE). FHA provides a framework for linking health business processes to technology solutions and standards, and for demonstrating how these solutions achieve improved health performance outcomes.
Formulary	A list of medications (both generic and brand names) that are covered by a specific health insurance plan or pharmacy benefit manager (PBM), used to encourage utilization of more cost-effective drugs. Hospitals sometimes use formularies of their own, for the same reason.
Health Information Technology (HIT)	The application of information processing involving both computer hardware and software that deals with the storage, retrieval, sharing, and use of health care information, data, and knowledge for communication and decision-making.
Health Information Exchange (HIE)	The electronic movement of health-related information among organizations according to nationally recognized standards. Health Information Exchange is a term commonly used to describe a Regional Health Information Organization (RHIO). The notion of HIE is the precursor to RHIO and is used interchangeably when discussing RHIO.

Term	Definition
Health Insurance Portability and Accountability Act of 1996 (HIPAA)	A federal law intended to improve the portability of health insurance and simplify health care administration. HIPAA sets standards for electronic transmission of claims-related information and for ensuring the security and privacy of all individually identifiable health information.
Health Level 7 (HL7)	HL7 is one of several American National Standards Institute (ANSI)-accredited standards-developing organizations operating in the health care arena. Health Level 7's domain is clinical and administrative data.
Healthcare Information Technology Standards Panel (HITSP)	Sponsored by ANSI under a contract from ONC, HITSP is a public/private partnership dedicated to facilitating the harmonization of consensus-based standards necessary to enable the widespread interoperability of health care information in the United States.
Informed consent	Informed consent is a process of information exchange that may include, in addition to reading and signing the informed consent documents, subject recruitment materials, verbal instructions, question/answer sessions and measures of subject understanding. The clinical investigator is responsible for ensuring that informed consent is obtained from each research subject before that subject participates in the research study.
Interoperability	HIMSS' definition of interoperability is "ability of health information systems to work together within and across organizational boundaries in order to advance the effective delivery of healthcare for individuals and communities." For further information, visit HIMSS Interoperability Definition and Background (PDF).
Legacy system	An existing Information Technology (IT) system or application, often built around a mainframe computer, which generally has been in place for a long time and represents a significant investment. Compatibility with legacy systems is often a major issue when considering new applications.

Term	Definition
Master Patient Index (MPI)	A database program that collects a patient's various hospital identification numbers, e.g. from the blood lab, radiology department, and admissions, and keeps them under a single, enterprise-wide identification number.
Nationwide Health Information Network (NHIN)	The name of the federal government's program to implement a national interoperable system for sharing electronic medical records or EMRs (a.k.a. electronic health records or EHR). NHIN describes the technologies, standards, laws, policies, programs and practices that enable health information to be shared among health decision makers, including consumers and patients, to promote improvements in health and healthcare. The development of a vision for the NHIN began more than a decade ago with publication of an Institute of Medicine report, “The Computer-Based Patient Record”.
Office of the National Coordinator of Health Information Technology (ONC)	Previously referred to as ONCHIT, ONC provides leadership for the development and nationwide implementation of an interoperable health information technology infrastructure to improve the quality and efficiency of health care and the ability of consumers to manage their care and safety.
Personal Health Record (PHR)	An electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that can be drawn from multiple sources while being managed, shared, and controlled by the individual.
Portal	A Web site that offers a range of resources, such as email, chat boards, search engines, and content.
Provider	A provider is an individual or group of individuals who directly (primary care physicians, psychiatrists, nurses, surgeons, etc) or indirectly (laboratories, radiology clinics, etc) provide health care to patients.

Term	Definition
Public Health	Public health is the art and science of safeguarding and improving community health through organized community effort involving prevention of disease, control of communicable disease, application of sanitary measures, health education, and monitoring of environmental hazards.
Regional Health Information Organization (RHIO)	A health information organization that brings together health care stakeholders within a defined geographic area and governs health information exchange among them for the purpose of improving health and care in that community.
Regulatory Agencies	Regulatory agencies are governmental and often report to the executive branch (state and federal). They regulate the activity of organizations and individuals as generally outlined in rules or regulations (e.g., Medicaid agencies, public health authorities, Board of Medical Examiners, insurance commissions, consumer protection agencies).
Scalability	The ability to add users and increase the capabilities of an application without having to making significant changes to the application software or the system on which it runs.
Stakeholder	A stakeholder is any organization or individual that has a stake in the exchange of health information, including health care providers, health plans, health care clearinghouses, regulatory agencies, associations, consumers, and technology vendors.
Telehealth	The use of telecommunications and information technology to deliver health services and transmit health information over distance. Sometimes called telemedicine.
Telemedicine	The use of telecommunications and information technology to deliver health services and transmit health information over distance. Sometimes called telehealth.

Term	Definition
Total Cost of Ownership (TCO)	A long-term view of all costs associated with a specific technology investment. Costs include that of acquiring, installing, using, maintaining, changing, and disposing of a technology during its useful life.
Vendors	Vendors are organizations that provide services and supplies to other organizations. In the context of health information exchange, the term usually refers to technology vendors who provide hardware or software, such as electronic health records, e-Prescribing technology, or security software.

Appendix C: Related Acronyms

ACP	Access Consent Policy
ANSI	American National Standards Institute
API	Application Programming Interface
ARRA	American Reinvestment and Recovery Act
BC/BS	Blue Cross/Blue Shield
BPPC	Basic Patient Privacy Consents
BTOP	Broadband Technology Opportunities Program
CAH	Critical Access Hospital
CBCM	Care-Based Cost Management
CCD	Continuity of Care Document
CCHIT	Certification Commission for Healthcare IT
CDA	Clinical Document Architecture
CDC	Centers for Disease Control and Prevention
CFR	Code of Federal Regulations
CITL	Center for Information Technology Leadership
CMS	Centers for Medicare and Medicaid
CPOE	Computerized Physician Order Entry
CRH	Center for Rural Health
DHHS	Department of Health and Human Services
DoD	Department of Defense
DURSA	Data Use and Reciprocal Support Agreement
EDI	Electronic Data Interchange
EHR	Electronic Health Record
eMPI	Enterprise Master Patient Index
EMR	Electronic Medical Record
EP	Eligible Professional
ESB	Enterprise Service Bus
FHA	Federal Health Architecture
FIPS	Federal Information Processing Standards
GIPSE	Geocoded Interoperable Population Summary Exchange
GUI	Graphical User Interface

HHS	Department of Health and Human Services
HIE	Health Information Exchange
HIMMS	Healthcare Information and Management Systems Society
HIO	Health Information Network
HIPAA	Health Information Portability and Accessibility Act
HISPC	Health Information Security and Privacy Collaboration
HIT	Health Information Technology
GEHC	Health Information Technical Advisory Committee
HITECH	Health Information Technology for Economic and Clinical Health
HL7	Health Level 7
HRSA	Health Resource Service Administration
ICD	International Classification of Diseases
IHE	Integrating the Healthcare Enterprise
IHS	Indian Health Services
LOINC	Logical Observation Identifiers Names and Codes
MITA	Medicaid Information Technology Architecture
MMIS	Medicaid Management Information System
NCPDP	National Council for Prescription Drug Programs
NHIN	Nationwide Health Information Network
NIH	National Institutes of Health
NIST	National Institutes of Standards and Technology
NLM	National Library of Medicine
NPI	National Provider Identifer
ONC	Office of the National Coordinator
PHI	Protected Health Information
PKI	Public Key Infrastructure
PQRI	Patient Quality Reporting Initiative
RBAC	Role-Based Access Control
REC	Regional Extension Centers
RFP	Request for Proposal
RHIO	Regional Health Information Organization
RLS	Record Locator Service

ROI	Return on Investment
SaaS	Software as a Service
SAMHSA	Substance Abuse and Mental Health Services Administration
SME	Subject Matter Expert
SMHP	Medicaid State Health Information Technology Plan
SOA	Service Oriented Architecture
SOAP	Simple Object Access Protocol
SOP	Strategic and Operational Plan
SSA	Social Security Administration
UCUM	Unified Code for Units of Measure
UDDI	Universal Description, Discovery, and Integration
UMLS	Unified Medical Language System
VA	Veterans Administration
XDS	Cross-Enterprise Document Sharing
XDR	Cross-Enterprise Document Reliable Interchange

Addendum 1: Guam health Information Exchange Addendum and Response to ONC Letter, Dated 02/17/11

Guam Health Information Exchange Addendum and Response to ONC

Executive Summary

The Guam Health Information Exchange (HIE) is focused on providing a strategy and approach, including full collaboration with the Regional Extension Center (REC) and full compliance with the ONC Program Information Notice (PIN), to assist all providers on Guam to meet the Meaningful Use requirements in 2011. The Guam HIE will provide support for multiple connectivity methodologies, including full support of NHIN Direct (The Direct Project) to allow any provider on Guam to easily and openly connect, using NHIN Direct capabilities, to the Guam HIE starting in 2011 as well as meet Meaningful Use criteria.

The Guam HIE has partnered with the firms of Hielix and MEDNET to provide overall strategy, provider outreach, coordination with the REC, and NHIN/HIE expertise. MEDNET has worked on multiple NHIN CONNECT and NHIN Direct projects, including multiple Social Security Administration (SSA) HIE MEGAHIT (bi-directional exchange of CCD data over NHIN) projects with the Marshfield Clinic and the C.H.I.C. HIE-Bridge HIE; the CMS NHIN esMD project with the Lewis And Clark Information Exchange (LACIE); the Veterans Administration and Department of Defense (DoD) VLER project; and several other CONNECT and Direct projects.

Seonho Kim, Chief Architect of MEDNET, is a participant on the Standards and Interoperability Framework Initiatives, the NHIN Specification Factory, as well as the NHIN Direct workgroups. Kim will oversee the construction and implementation of the Guam HIE, ensuring NHIN CONNECT and NHIN Direct compliancy and interoperability as well as full compliancy and interoperability with the Program Information Notice (PIN). By utilizing NHIN Exchange and NHIN Direct in 2011 as well as utilizing personnel with intimate experience with these standards, the Guam HIE will provide full support for providers and HIE stakeholders to connect to the Guam HIE (and each other) using NHIN Exchange and NHIN Direct specifications in 2011.

The Guam HIE is focused on driving the adoption of ePrescribing on Guam; therefore, the Guam HIE will continue to provide coordination, education and outreach to the pharmacies on Guam. It should be noted that all (100%) of the pharmacies on Guam have ePrescribing capabilities. Therefore, the Guam HIE will continue to coordinate with pharmacies, while working in close collaboration with the REC to provide any and all additional resources (outreach, training, education) to providers to ensure adoption of ePrescribing technologies and systems by the providers on Guam. Additionally, the Guam HIE will continue to provide this outreach, training, education and support to those providers not working with the REC, making sure that no provider on Guam is missed. The Guam HIE will also work with four major payers on Guam to create incentives and other creative solutions (contractual, etc) to drive the adoption and

utilization of ePrescribing on Guam. By working with both the pharmacies and the providers, the Guam HIE will focus on driving the adoption and utilization of ePrescribing on Guam in 2011 and beyond.

The Guam HIE is focused on the coordination with laboratories and the interoperable exchange (i.e. pushing/pulling) of lab results into the EHR for providers; thus the Guam HIE will continue to coordinate activities and resources with the two main laboratories: DLS (90% of market share) and LabTech (10% of market share). DLS and LabTech are the only two laboratory companies, out of the seven laboratories on Guam, capable of providing advanced laboratory tests and diagnostic services, and both company's main laboratory and diagnostic facilities are located in Hawaii. The Guam HIE has been working with both DLS and LabTech on furthering the electronic exchange of lab data and results (pushing/pulling of results) into and through provider EHRs.

As of today, Seventh Day Adventist clinics, a major provider on Guam which is visited by over 25% of patients on Guam, has their DLS lab results pushed fully into the EHR, and Guam Memorial Hospital (GMH) which is visited by an additional 25% of patients is currently working with DLS on a similar solution with coordination from the Guam HIE. Further, the Guam HIE is coordinating and working with both DLS and LabTech to provide results into all provider EHRs (beyond Seventh Day Adventist and Guam Memorial Hospital, however, over 50% of the total patients on Guam currently visit one or both of these facilities), and will be offering NHIN Direct as a connectivity methodology beginning in 2011.

The remaining five laboratories on Guam have varying degrees of technology and systems, thus the Guam HIE will continue to work with these labs on specific plans for connectivity with the Guam HIE and providers, including the interoperable exchange (pushing/pulling) of lab results into provider EHRs. The Guam HIE will also work with the REC, and continue to work on outreach, training, and education for all labs on future standards, formats, and interoperable exchange of lab results.

Guam HIE Strategy for NHIN Direct Support

Nationwide Health Information Network (NHIN) Exchange & Direct Project

NHIN Exchange supports health information exchange across health information organizations (HIOs) including but not limited to HIEs and federal agencies. The Direct Project was launched in March 2010 to specify ***a simple, secure, scalable, standards-based way for participants to send authenticated, encrypted health information directly to known, trusted recipients over the Internet***. The Direct Project expands existing Nationwide Health Information Network standards and service descriptions to address the key Stage 1 requirements for Meaningful Use and to provide an easy "on-ramp" to nationwide exchange for a wide set of providers and organizations.

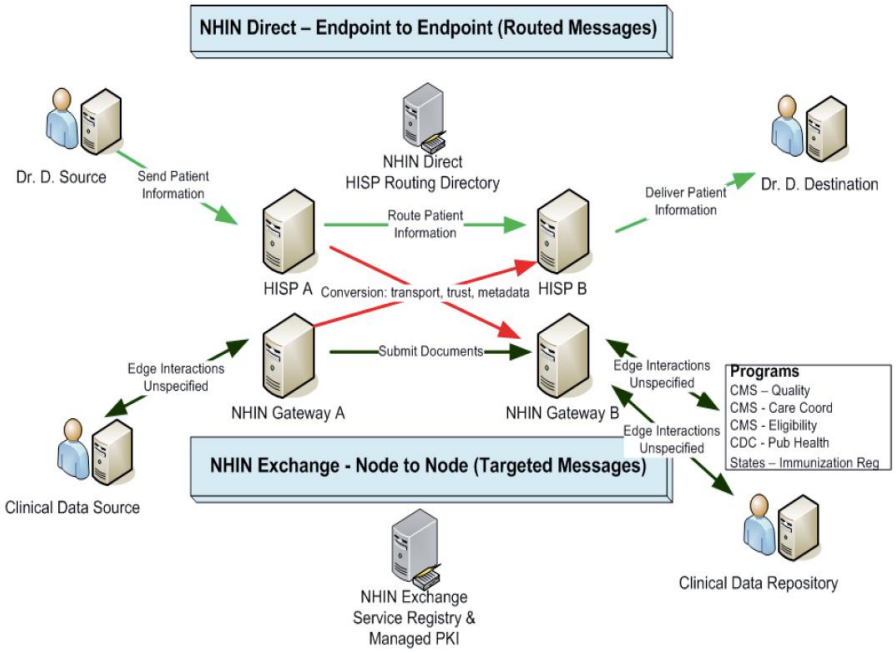


Figure 1 NHIN Exchange & Direct Project (source ONC)

From a technical perspective, NHIN Exchange supports node-to-node (or entity-to-entity) data exchange while Direct Project supports point-to-point (or endpoint-to-endpoint) data exchange as shown in Figure 1. Even though some business use-cases can be supported/implemented by either NHIN Exchange or Direct, the Direct Project complements existing NHIN Exchange Specifications, NHIN CONNECT, and the NHIN Exchange. The Direct Project defines itself as, "*It is a **project**, with a beginning and an end, to draft the specifications and services (including open-source reference implementations) that address simple, direct communication between known participants. The Direct standards and services can be implemented by any two participants, organizations or a community without a central governance structure".*

Figure 2 shows an example pattern where NHIN Exchange and Direct are combined to support provider-to-provider data exchange use-cases. In this use-case, a provider wants to send

clinical documents in CCD/C32 format through the Exchange. NHIN Gateway queries and retrieves documents from an EHR system, packages/encrypts the documents along with metadata, attaches to an email, and sends the message to the end user.

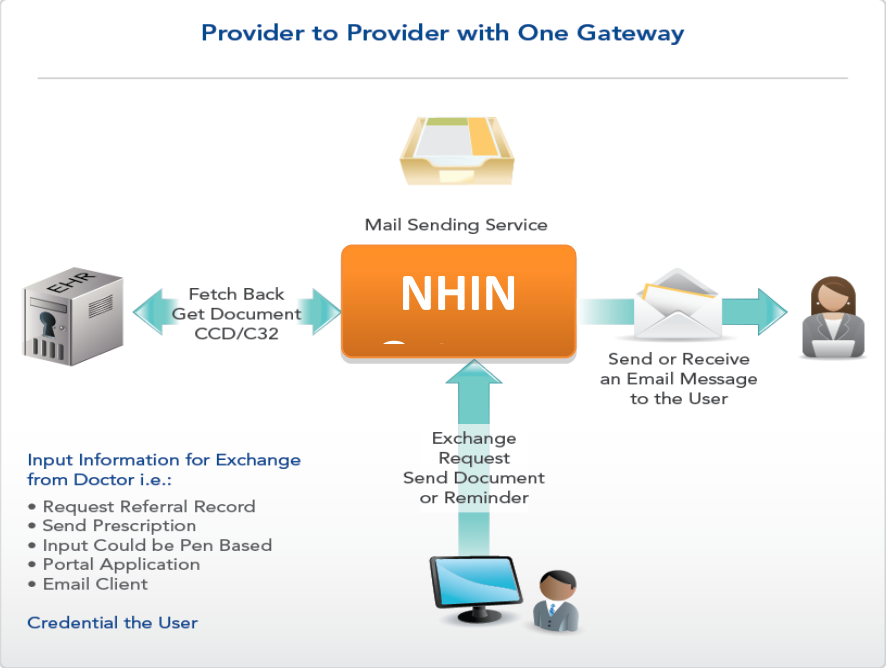


Figure 2 A Pattern combining NHIN Exchange and Direct (source: CONNECT EHRI-SIG)

Direct Project: User Stories and Limitations

Generally speaking, the Direct Project does not target complex use-cases and scenarios. Instead it focuses on the transport of relatively simple, direct, point-to-point electronic communications. Specifically, it does not support the "pulling" model (search/discover or query/retrieve) – the communication model is based on a "push" model. In addition, it alone does not support interoperability (semantics[10] and vocabulary[11]). This is because the Direct Project targets a simple way to exchange health information between endpoints. Below are first-priority user stories that support Stage 1 Meaningful Use of EHR technology and are targeted by the Direct Project.

- Primary care provider refers patient to specialist including summary care record
- Primary care provider refers patient to hospital including summary care record

[10] The structure and format of the exchanged content (e.g., CCD/C32, CCR, or other data standards)

[11] The terminology used within the content (e.g., SNOMED CT)

- Specialist sends summary care information back to referring provider
- Hospital sends discharge information to referring provider
- Laboratory sends lab results to ordering provider
- Transaction sender receives delivery receipt
- Provider sends patient health information to the patient
- Hospital sends patient health information to the patient
- Provider sends a clinical summary of an office visit to the patient
- Hospital sends a clinical summary at discharge to the patient
- Provider sends reminder for preventive or follow-up care to the patient
- Primary care provider sends patient immunization data to public health

Technical Aspects of Direct Projects

Direct Project implementation has the following four core technical requirements.

- Content is packaged using MIME and, optionally, XDM ➔ Separating the routing of messages from the clinical content.
- Confidentiality and integrity of the content is handled through S/MIME encryption and digital signatures.
- Authenticity of the Sender and Receiver is established with X.509 digital certificates.
- Routing of messages is handled through SMTP.

The Direct Project and The Guam Health Information Exchange

One of benefits of leveraging the Direct Project is that "it simplifies the number of agreements for participants so that it can extend the reach to include those who could not otherwise participate in health information exchange". Figure 3 below shows a Direct-based abstract communication model for the Guam HIE.

An NHIN Direct Gateway is part of the overall Guam HIE technical infrastructure, and NHIN Direct is fully supported in the Guam HIE (and will be implemented in 2011, allowing for any provider to easily and openly connect, using NHIN Direct, to the Guam HIE and each other in 2011). It should be noted that the Guam government acts as a Health Information Service Provider (HISP)[12] for some providers, hospitals, and laboratories in Guam. Some providers, hospitals, and laboratories may also be affiliated with a 3rd party HISP for Direct Project services.

The Guam HIE does not intend to replace any existing health information exchange capabilities with the Direct Project. Instead, the Guam HIE will provide Direct-based services (acting as an HIE-governed HISP) as an option for individual providers (primary care physicians, specialists etc), providers (unaffiliated hospitals, clinics, etc), and laboratories – mostly small office

[12] An entity that is responsible for delivering health information as messages between senders and receivers using the Direct project technology over the Internet

providers, small regional providers and clinics who cannot afford or are not planning for 2011 an implementation/support of Stage 1 Meaningful Use HIE requirements (a capability to exchange key clinical information), and/or future Stage 2 and 3 Meaningful Use requirements[13] (to connect to at least three external providers in primary referral network or establish an ongoing bidirectional connection to at least one HIE). The Guam HIE will fully support NHIN Direct, and will provide NHIN Direct as a connectivity methodology in 2011 for any provider who chooses to connect to the Guam HIE utilizing NHIN Direct.

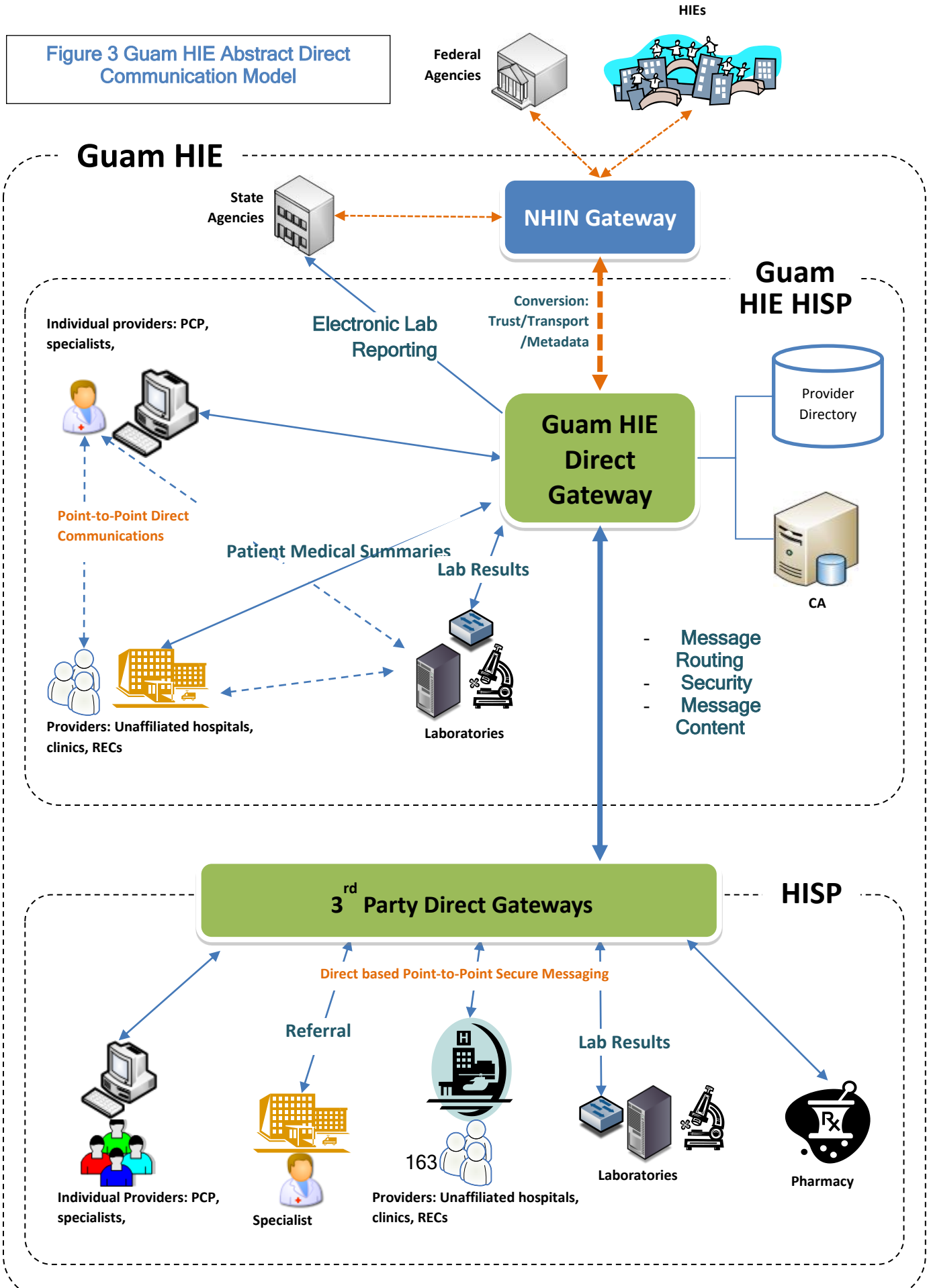
Additionally, the Guam HIE will provide (and continue) coordination with the Regional Extension Center (REC) to allow for education and outreach on NHIN Direct, ensuring that the REC and providers are fully aware of the potential of Direct, as well as Direct as a fully supported 2011 HIE connectivity methodology. The HIE staff and team will focus on supporting the REC to make sure the REC can support each and every provider on NHIN Direct. This outreach and coordination with the REC by the HIE team and staff will be ongoing, beginning in 2011. The HIE will also continue to provide training and outreach/education to providers who are not working with the REC, to make sure no provider is left behind or missed in the educational/outreach program on Direct.

Support for Direct will target three main use-cases:

1. A provider with no EMR/EHR: These providers can utilize Direct to connect to the Guam HIE, including messaging, in 2011
2. A provider with an EMR/EHR communicating with a provider with no EMR/EHR: Both providers can utilize Direct as a messaging platform, allowing for the exchange and share data
3. Two providers with EMRs/EHRs: These providers utilize Direct for secure messaging from EMR/EHR system to system

[13] Proposed Stage 2 and Stage 2 MU criteria

Figure 3 Guam HIE Abstract Direct Communication Model



In order to support Direct, the Guam HIE will develop a provider directory which will contain end-provider information such as endpoints and digital certificates. Both Direct and NHIN Exchange leverage Public Key Infrastructure (PKI) technology which requires a Certificate Authority (CA) to issue digital certificates for providers. To support health information exchange with neighboring state and territory HIEs and federal agencies, the Guam HISP will include modules for conversion (transport, trust, and data content) between NHIN Exchange and Direct.

Strategy for Direct Implementation

A high-level project plan is detailed below, including the implementation of NHIN Direct by second Quarter, 2011.

ID	Task Name	Duration	Start	Finish
1	**Guam HIE Strategic and Operational Plan Deployment**	**238 days**	**Fri 4/1/11**	**Tue 2/28/12**
2	**Governance Domain Implementation**	**238 days**	**Fri 4/1/11**	**Tue 2/28/12**
3	**GeHC Board Formation**	**20 days**	**Fri 4/1/11**	**Thu 4/28/11**
4	**Appoint Board Members**	**19 days**	**Fri 4/1/11**	**Wed 4/27/11**
5	Appoint Finance Team	19 days	Fri 4/1/11	Wed 4/27/11
6	Appoint Technical Infrastructure Team	19 days	Fri 4/1/11	Wed 4/27/11
7	Appoint Business and Tech Operations Team	19 days	Fri 4/1/11	Wed 4/27/11
8	Appoint Legal and Policy Team	19 days	Fri 4/1/11	Wed 4/27/11
9	Appoint Communications Team	19 days	Fri 4/1/11	Wed 4/27/11
10	Appoint Provider Adoption Team	19 days	Fri 4/1/11	Wed 4/27/11
11	Hold kickoff meeting for each Domain Team	1 day	Thu 4/28/11	Thu 4/28/11
12	Meet and adopt Domain Team Charters for each team	1 day	Thu 4/28/11	Thu 4/28/11
13	**Milestone: Board Formed and Functioning**	**0 days**	**Thu 4/28/11**	**Thu 4/28/11**
14	**Milestone: Domain Teams Formed and functioning**	**0 days**	**Thu 4/28/11**	**Thu 4/28/11**
15				
16	**May GeHC Board and Domain Team Meeting**	**1 day**	**Mon 5/23/11**	**Mon 5/23/11**
17	Hielix staff provides on-site facilitation			
18	Provide agendas, record minutes, record action items			
19	Work with the GeHC to produce necessary materials			
20	Work with the GeHC to manage project initiatives			
21	Develop project plan, work assignments and milestones			
22	Write necessary reports			
23	Present on GeHC activities to stakeholders			
24	**Milestone: Hielix staff onsite, meetings conducted and project plan approved**	**0 days**	**Mon 5/23/11**	**Mon 5/23/11**
25	**Milestone: Action items with assigned responsibility determined**	**0 days**	**Mon 5/23/11**	**Mon 5/23/11**
26				
27	**June GeHC Board Meeting**	**1 day**	**Thu 6/30/11**	**Thu 6/30/11**
34	**Milestone: Meetings conducted and project plan approved**	**0 days**	**Thu 6/30/11**	**Thu 6/30/11**
35	**Milestone: Action items with assigned responsibility determined**	**0 days**	**Thu 6/30/11**	**Thu 6/30/11**
36				
37	**July GeHC Board Meeting**	**1 day**	**Wed 7/27/11**	**Wed 7/27/11**
44	**Milestone: Meetings conducted and project plan approved**	**0 days**	**Wed 7/27/11**	**Wed 7/27/11**
45	**Milestone: Action items with assigned responsibility determined**	**0 days**	**Wed 7/27/11**	**Wed 7/27/11**
46				
47	**August GeHC Board and Domain Team Meeting**	**1 day**	**Thu 8/25/11**	**Thu 8/25/11**
55	**Milestone: Hielix staff onsite, Meetings conducted and project plan approved**	**0 days**	**Thu 8/25/11**	**Thu 8/25/11**
56	**Milestone: Action items with assigned responsibility determined**	**1 day**	**Thu 8/25/11**	**Thu 8/25/11**
57				
58	**September GeHC Board Meeting**	**1 day**	**Thu 9/29/11**	**Thu 9/29/11**
65	**Milestone: Meetings conducted and project plan approved**	**0 days**	**Thu 9/29/11**	**Thu 9/29/11**

ID	Task Name	Duration	Start	Finish
66	**Milestone: Action items with assigned responsibility determined**	**0 days**	**Thu 9/29/11**	**Thu 9/29/11**
67				
68	**October GeHC Board Meeting**	**1 day**	**Thu 10/27/11**	**Thu 10/27/11**
75	**Milestone: Meetings conducted and project plan approved**	**0 days**	**Thu 10/27/11**	**Thu 10/27/11**
76	**Milestone: Action items with assigned responsibility determined**	**0 days**	**Thu 10/27/11**	**Thu 10/27/11**
77				
78	**November GeHC Board Meeting**	**1 day**	**Mon 11/28/11**	**Mon 11/28/11**
86	**Milestone: Hielix staff onsite, Meetings conducted and project plan approved**	**0 days**	**Mon 11/28/11**	**Mon 11/28/11**
87	**Milestone: Action items with assigned responsibility determined**	**0 days**	**Mon 11/28/11**	**Mon 11/28/11**
88				
89	**December GeHC Board Meeting**	**1 day**	**Wed 12/28/11**	**Wed 12/28/11**
96	**Milestone: Meetings conducted and project plan approved**	**0 days**	**Wed 12/28/11**	**Wed 12/28/11**
97	**Milestone: Action items with assigned responsibility determined**	**0 days**	**Wed 12/28/11**	**Wed 12/28/11**
98				
99	**January GeHC Board Meeting**	**1 day**	**Fri 1/27/12**	**Fri 1/27/12**
106	**Milestone: Meetings conducted and project plan approved**	**0 days**	**Fri 1/27/12**	**Fri 1/27/12**
107	**Milestone: Action items with assigned responsibility determined**	**0 days**	**Fri 1/27/12**	**Fri 1/27/12**
108				
109	**February GeHC Board Meeting**	**1 day**	**Tue 2/28/12**	**Tue 2/28/12**
117	**Milestone: Hielix staff onsite, Meetings conducted and project plan approved**	**0 days**	**Tue 2/28/12**	**Tue 2/28/12**
118	**Milestone: Action items with assigned responsibility determined**	**0 days**	**Tue 2/28/12**	**Tue 2/28/12**
119				
120	**Finance Domain Implementation**	**217 days**	**Sun 4/3/11**	**Tue 1/31/12**
121	**April Finance Activities**	**21 days**	**Sun 4/3/11**	**Fri 4/29/11**
122	Research and analysis of existing HIE models in other states			
123	Develop financing principles and strategies			
124	Report on sustainability models			
125	**Milestone: Financing principles and strategies prepared and sent to the Domain Team**	**0 days**		
126				
127	**May Finance Activities**	**20 days**	**Sun 5/1/11**	**Thu 5/26/11**
128	Establish baseline metrics used for the business and financial plan			
129	Present the financing principles and strategies to the Domain Team for approval			
130	**Milestone: Baseline metrics prepared and presented to the Domain Team**	**0 days**		

ID	Task Name	Duration	Start	Finish
131	**Milestone: Obtain team approval of financing principles, strategies and baseline metrics**	**0 days**		
132				
133	**June Finance Activities**	**21 days**	**Wed 6/1/11**	**Wed 6/29/11**
134	Develop return on investment criteria for each stakeholder			
135	**Milestone: Return on investment criteria prepared and presented to the Domain Team**	**0 days**		
136	**Milestone: Obtain team approval on return on investment criteria**	**0 days**		
137				
138	**July Finance Activities**	**21 days**	**Fri 7/1/11**	**Fri 7/29/11**
139	Create capital and operational financing strategies			
140	**Milestone: Capital and operational financing strategies prepared and presented to the Domain Team**	**0 days**		
141	**Milestone: Obtain team approval on the capital and operational financing strategies requirements**	**0 days**		
142				
143	**August Finance Activities**	**22 days**	**Tue 8/2/11**	**Wed 8/31/11**
144	Integrate the business and financial sustainable plan with the strategic and operational plan			
145	**Milestone: Integration requirements of the business plan with the strategic and operational plan prepared and presented to the Domain Team**	**0 days**		
146	**Milestone: Obtain team approval on the integration requirements**	**0 days**		
147				
148	**September Finance Activities**	**22 days**	**Thu 9/1/11**	**Fri 9/30/11**
149	Provide modeling tools to assist with decision making			
150	**Milestone: Modeling tools prepared and presented to the Domain Team**	**0 days**		
151	**Milestone: Obtain team approval on the modeling tools**	**0 days**		
152				
153	**October Finance Activities**	**21 days**	**Mon 10/3/11**	**Mon 10/31/11**
154	Build consensus with the Finance Domain Team for a sustainable model			
155	**Milestone: Sustainability model prepared and presented to the Domain Team**	**0 days**		
156	**Milestone: Obtain team approval on the sustainable model**	**0 days**		
157				
158	**November Finance Activities**	**21 days**	**Tue 11/1/11**	**Tue 11/29/11**
159	Present the approved sustainable model to the major stakeholders for discussion			
160	Build the HIE Services Plan for Consulting Revenue			
161	**Milestone: Presentation of the sustainability plan to stakeholders**	**0 days**		
162	**Milestone: HIE services plan prepared and presented**	**0 days**		
163				

ID	Task Name	Duration	Start	Finish
164	**December Finance Activities**	**22 days**	**Thu 12/1/11**	**Fri 12/30/11**
165	Finalize negotiations with all stakeholders on financial sustainability			
166	Design the products and services for the HIE to generate revenues for ongoing operations			
167	**Milestone: Negotiations completed with all major stakeholders**	**0 days**		
168	**Milestones: HIE products and services defined and approved**	**0 days**		
169				
170	**January Finance Activities**	**21 days**	**Tue 1/3/12**	**Tue 1/31/12**
171	Create the marketing plan to sell HIE services to stakeholders			
172	**Milestone: HIE products and services marketing plan approved**	**0 days**		
173				
174	**Technical Infrastructure Domain Implementation**	**150 days**	**Sun 4/3/11**	**Fri 10/28/11**
175	**April Technical Activities**	**21 days**	**Sun 4/3/11**	**Fri 4/29/11**
176	Work in conjunction with the GeHII and Guam HIE Stakeholders to architect an operational HIE with availability of NHIN Direct connectivity for pharmacies, labs and small providers prior to Q4 2012			
177	Complete a technical stakeholder environmental scan, emphasizing smaller organizations that could rapidly deploy NHIN Direct technology			
178	Engage with Communication and Adoption teams to plan technical outreach to encourage use of NHIN Direct technology by small providers, pharmacies and labs			
179	Create and deliver a technical project plan, including the deliverable of NHIN Direct connectivity for pharmacies, labs and small providers prior to Q4 2012			
180	Meet with Phase I HIE stakeholders and participants and kickoff the implementation phase			
181	**Milestone: HIE architecture completed with NHIN Direct components and submitted to GeHC for approval**	**0 days**		
182				
183	**May Technical Activities**	**20 days**	**Sun 5/1/11**	**Thu 5/26/11**
184	Delivery of GRID Server with integrated Enterprise Master Patient Index, Patient Consent Management Modules , Federated Identity Management with Role-Based Access Controls and Public Key Infrastructure			
185	Delivery of NHIN Connect Gateway Server to facilitate HIE communication with trading partners			
186	Delivery of NHIN Direct Gateway Server with support for e-prescribing and electronic lab transactions			
187	Ongoing technical outreach to encourage use of NHIN Direct technology			
188	**Milestone: GRID Server installed and functioning**	**0 days**		

ID	Task Name	Duration	Start	Finish
189	**Milestone: NHIN Direct Gateway Server installed and functioning**	**0 days**		
190				
191	**June Technical Activities**	**23 days**	**Wed 6/1/11**	**Fri 7/1/11**
192	Delivery and integration of 5 EDGE Servers at key HIE Stakeholders for Record Locator Services and ability for future CCD exchange			
193	Ongoing technical outreach to encourage use of NHIN Direct technology			
194	**Milestone: Edge servers delivered, installed and tested**	**0 days**		
195				
196	**July Technical Activities**	**21 days**	**Fri 7/1/11**	**Fri 7/29/11**
197	Edge servers delivered, installed and tested			
198	NHIN Direct integration with HIE Portal complete			
199	Assess success of outreach efforts encouraging use of NHIN Direct technology by providers, labs and pharmacies			
200	**Milestone: NHIN Direct portal integration installed and functioning**	0 days		
201	**Milestone: HIE portal operational**	**0 days**		
202				
203	**August Technical Activities**	**22 days**	**Tue 8/2/11**	**Wed 8/31/11**
204	Rollout of HIE portal for up to 100 physicians with RBAC/FIM/Single-Sign On/NHIN Direct integration			
205	Rollout of 7 stakeholder stand alone portals			
206	Ongoing technical outreach to encourage use of NHIN Direct technology			
207	**Milestone: HIE portal roll out successful with NHIN Direct capability and 100 physicians having the capacity to use the portal**	**0 days**		
208				
209	**September Technical Activities**	**22 days**	**Thu 9/1/11**	**Fri 9/30/11**
210	Ongoing project management, support, training, and on-site visits to ensure provider adoption and rollout of HIE and HIE use-cases			
211	Ongoing technical outreach to encourage use of NHIN Direct technology			
212	**Milestone: On-site visits completed**	**0 days**		
213				
214	**October Technical Activities**	**21 days**	**Sat 10/1/11**	**Fri 10/28/11**
215	Integrated and customized Guam HIE Portal delivered and users trained			
216	Assess success of outreach efforts encouraging use of NHIN Direct technology by providers, labs and pharmacies			
217	**Milestone: HIE Portal fully operational with NHIN Direct functionality**	**0 days**		
218				
219	**Business and Technical Operations Domain Implementation**	**130 days**	**Sun 4/3/11**	**Fri 9/30/11**

ID	Task Name	Duration	Start	Finish
220	**April Business Activities**	**21 days**	**Sun 4/3/11**	**Fri 4/29/11**
221	Research and identify model data sharing and data use agreements			
222	Create the set of common forms for HIE operations including, Data Sharing, Patient Consent, Data Use, Business Associate, Audit Reports, Privacy and Security			
223	**Milestone: Data use and data sharing agreements identified**	**0 days**		
224				
225	**May Business Activities**	**20 days**	**Sun 5/1/11**	**Thu 5/26/11**
226	Research and identify model business associate agreements for stakeholder approval			
227	Coordination with Other Agencies (Medicaid, REC, Public Health, Workforce Development, etc.)			
228	**Milestone: Business associate agreements identified**	**0 days**		
229				
230	**June Business Activities**	**22 days**	**Wed 6/1/11**	**Thu 6/30/11**
231	Prepare the initial process and procedures for operating the HIE			
232	**Milestone: Process and procedures developed and submitted for approval**	**0 days**		
233				
234	**July Business Activities**	**21 days**	**Fri 7/1/11**	**Fri 7/29/11**
235	Obtain approval on the basic process and procedures for HIE operations			
236	**Milestone: Process and procedures approved**	**0 days**		
237				
238	**August Business Activities**	**22 days**	**Tue 8/2/11**	**Wed 8/31/11**
239	HIE portal roll out successful with 100 physicians having the capacity to use the portal			
240	Negotiate with and secure the participation of various stakeholders in the Territory of Guam			
241	Coordination with Other Agencies (Medicaid, REC, Public Health, Workforce Development, etc.)			
242	**Milestone: Portal operational**	**0 days**		
243	**Milestone: Agreement with stakeholders achieved**	**0 days**		
244				
245	**September Business Activities**	**22 days**	**Thu 9/1/11**	**Fri 9/30/11**
246	Provide education and training for stakeholder on HIE policies and procedures			
247	**Milestone: Education and training provided to stakeholders**	**0 days**		
248				
249	**Legal and Policy Domain Implementation**	**108 days**	**Sun 4/3/11**	**Wed 8/31/11**
250	**April Policy Activities**	**21 days**	**Sun 4/3/11**	**Fri 4/29/11**
251	Review and analyze the legal and policy framework for exchanging healthcare data with Mainland states			
252	**Milestone: Legal and policy framework identified and presented to the Domain Team**	**0 days**		

ID	Task Name	Duration	Start	Finish
253				
254	**May Policy Activities**	**20 days**	**Sun 5/1/11**	**Thu 5/26/11**
255	Review and analyze what other states are doing with their legal and policy framework			
256	**Milestone: Analysis of other states is completed and presented**	**0 days**		
257				
258	**June Policy Activities**	**21 days**	**Thu 6/2/11**	**Thu 6/30/11**
259	Meet with Mainland states to discuss and find common ground for resolving legal and policy differences			
260	**Milestone: Meetings completed and issues identified**	**0 days**		
261				
262	**July Policy Activities**	**21 days**	**Fri 7/1/11**	**Fri 7/29/11**
263	Work with GeHC to present the needed changes to the appropriate officials in Guam			
264	**Milestone: Issues presented to appropriate officials**	**0 days**		
265				
266	**August Policy Activities**	**22 days**	**Tue 8/2/11**	**Wed 8/31/11**
267	Recommend legislative changes			
268	**Milestone: Legislative changes proposed and provided to the Domain Team**	**0 days**		
269				
270	**Communications Domain Implementation**	**236 days**	**Sun 4/3/11**	**Mon 2/27/12**
271	**April Communications Activities**	**21 days**	**Sun 4/3/11**	**Fri 4/29/11**
272	Analyze the requirements for communications concerning HIE in Guam			
273	Engage with Technical and Adoption teams to plan outreach to encourage use of NHIN Direct technology by small providers, pharmacies and labs			
274	**Milestone: Analysis completed and presented to the Domain Team**	**0 days**		
275				
276	**May Communications Activities**	**20 days**	**Sun 5/1/11**	**Thu 5/26/11**
277	Create a marketing plan for communications for HIE in Guam			
278	**Milestone: Marketing plan completed and presented to the Domain Team**	**0 days**		
279				
280	**June Communications Activities**	**22 days**	**Wed 6/1/11**	**Thu 6/30/11**
281	Assist the Domain Team with implementing the communications marketing plan			
282	**Milestone: Assistance provided as requested**	**0 days**		
283				
284	**July Communications Activities**	**21 days**	**Fri 7/1/11**	**Fri 7/29/11**
285	Assist the Domain Team with implementing the communications marketing plan			
286	Assess success of outreach efforts encouraging use of NHIN Direct technology by providers, labs and pharmacies			

ID	Task Name	Duration	Start	Finish
287	**Milestone: Assistance provided as requested**	**0 days**		
288				
289	**August Communications Activities**	**22 days**	**Tue 8/2/11**	**Wed 8/31/11**
290	Assist the Domain Team with implementing the communications marketing plan			
291	**Milestone: Assistance provided as requested**	**0 days**		
292				
293	**September Communications Activities**	**22 days**	**Thu 9/1/11**	**Fri 9/30/11**
294	Assist the Domain Team with implementing the communications marketing plan			
295	**Milestone: Assistance provided as requested**	**0 days**		
296				
297	**October Communications Activities**	**21 days**	**Sat 10/1/11**	**Fri 10/28/11**
298	Assist the Domain Team with implementing the communications marketing plan			
299	**Milestone: Assistance provided as requested**	**0 days**		
300				
301	**November Communications Activities**	**22 days**	**Tue 11/1/11**	**Wed 11/30/1**
302	Assist the Domain Team with implementing the communications marketing plan			
303	Assess success of outreach efforts encouraging use of NHIN Direct technology by providers, labs and pharmacies			
304	**Milestone: Assistance provided as requested**	**0 days**		
305				
306	**December Communications Activities**	**22 days**	**Thu 12/1/11**	**Fri 12/30/11**
307	Assist the Domain Team with implementing the communications marketing plan			
308	**Milestone: Assistance provided as requested**	**0 days**		
309				
310	**January Communications Activities**	**21 days**	**Tue 1/3/12**	**Tue 1/31/12**
311	Assist the Domain Team with implementing the communications marketing plan			
312	**Milestone: Assistance provided as requested**	**0 days**		
313				
314	**February Communications Activities**	**19 days**	**Wed 2/1/12**	**Mon 2/27/12**
315	Assist the Domain Team with implementing the communications marketing plan			
316	Assess success of outreach efforts encouraging use of NHIN Direct technology by providers, labs and pharmacies			
317	**Milestone: Assistance provided as requested**	**0 days**		
318				
319	**Provider Adoption Domain Implementation**	**236 days**	**Sun 4/3/11**	**Mon 2/27/12**
320	**April Adoption Activities**	**21 days**	**Sun 4/3/11**	**Fri 4/29/11**
321	Analyze the requirements for consumer and provider adoption needs in Guam			
322	Engage with Communication and Technical teams to plan outreach to encourage use of NHIN Direct technology by small providers, pharmacies and labs			

ID	Task Name	Duration	Start	Finish
323	**Milestone: Analysis completed and presented to the Domain Team**	**0 days**		
324				
325	**May Adoption Activities**	**20 days**	**Sun 5/1/11**	**Thu 5/26/11**
326	Prepare a plan for increasing consumer and provider adoption			
327	**Milestone: Provider adoption plan developed and presented to the Domain Team**	**0 days**		
328				
329	**June Adoption Activities**	**19 days**	**Wed 6/1/11**	**Mon 6/27/11**
330	Create a marketing plan for educating and assisting consumers and providers in adopting HIT technology			
331	**Milestone: Marketing plan completed and presented to the Domain Team**	**0 days**		
332				
333	**July Adoption Activities**	**21 days**	**Fri 7/1/11**	**Fri 7/29/11**
334	Assist the Domain Team with implementing the marketing plan			
335	Assess success of outreach efforts encouraging use of NHIN Direct technology by providers, labs and pharmacies			
336	**Milestone: Assistance provided as requested**	**0 days**		
337				
338	**August Adoption Activities**	**22 days**	**Tue 8/2/11**	**Wed 8/31/11**
339	Assist the Domain Team with implementing the marketing plan			
340	**Milestone: Assistance provided as requested**	**0 days**		
341				
342	**September Adoption Activities**	**22 days**	**Thu 9/1/11**	**Fri 9/30/11**
343	Assist the Domain Team with implementing the marketing plan			
344	**Milestone: Assistance provided as requested**	**0 days**		
345				
346	**October Adoption Activities**	**21 days**	**Sat 10/1/11**	**Fri 10/28/11**
347	Assist the Domain Team with implementing the marketing plan			
348	**Milestone: Assistance provided as requested**	**0 days**		
349				
350	**November Adoption Activities**	**20 days**	**Tue 11/1/11**	**Mon 11/28/11**
351	Assist the Domain Team with implementing the marketing plan			
352	Assess success of outreach efforts encouraging use of NHIN Direct technology by providers, labs and pharmacies			
353	**Milestone: Assistance provided as requested**	**0 days**		
354				
355	**December Adoption Activities**	**22 days**	**Thu 12/1/11**	**Fri 12/30/11**
356	Assist the Domain Team with implementing the marketing plan			
357	**Milestone: Assistance provided as requested**	**0 days**		

ID	Task Name	Duration	Start	Finish
358				
359	**January Adoption Activities**	**22 days**	**Mon 1/2/12**	**Tue 1/31/12**
360	Assist the Domain Team with implementing the marketing plan			
361	**Milestone: Assistance provided as requested**	**0 days**		
362				
363	**February Adoption Activities**	**19 days**	**Wed 2/1/12**	**Mon 2/27/12**
364	Assist the Domain Team with implementing the marketing plan			
365	Assess success of outreach efforts encouraging use of NHIN Direct technology by providers, labs and pharmacies			
366	**Milestone: Assistance provided as requested**	**0 days**		

Guam HIE Strategy for ePrescribing Support

The Guam HIE will fully support ePrescribing as defined in the Program Information Notice (PIN). As all pharmacies (100%) on Guam currently have ePrescribing capabilities, all are utilizing some form of ePrescribing. The Guam HIE will focus on driving provider adoption of ePrescribing technologies to connect providers to the existing ePrecribing pharmacy network (and through the HIE) on Guam. The Guam HIE will continue the education, outreach, and communication with the pharmacies on Guam, and will work with pharmacy leaders and leadership/membership groups.

The Guam HIE staff will coordinate with the REC to educate the REC and providers on ePrescribing, and integrated EMR/EHR technologies that include ePrescribing. The HIE will also continue to provide training and outreach/education to providers who are not working with the REC, to make sure no provider is left behind or missed in the educational/outreach program on ePrescribing.

The Guam HIE will continue to work with the four major payers on Guam to look at the creation of incentives for ePrescribing, as well as contractual requirements, to drive the adoption of ePrescribing technologies and workflows from the provider community. The Guam HIE has a good working relationship with the four major payers on Guam, and thus, will continue to work with the payers on strategies, workflows, educational sessions, outreach, as well as incentives and contractual requirements for ePrescribing.

Specific strategies include:

- Strategy 1 - Work with the Regional Extension Center (REC) to develop a plan to provide assistance to providers in Guam who need help with EHR vendor selection. As many states have already created such a list, the Guam HIE will leverage this information and work with the REC to create a list of certified EHRs for Guam with particular focus on the needs for e-prescribing.

- Strategy 2 – Implement a standards-based architecture and core HIE services, including NHIN Direct, to assist providers meeting Stage 1 Meaningful Use requirements as described above

- Strategy 3 – Work with Guam Medicaid to integrate standards-based interface language requirements for providers focusing on e-prescribing capabilities

Guam HIE Strategy for Laboratory Support

There are seven laboratories on Guam, however most blood-related and advanced tests are outsourced to two companies: DLS labs in Hawaii or LabTech, also in Hawaii. The remaining five laboratories on Guam have limited, to extremely limited, facilities for providing lab tests and/or results (some are just screening or blood-drawing stations). DLS Labs accounts for over 90% of the advanced or blood-related lab tests on Guam, including acting as the Guam Reference Lab, with LabTech accounting for the remaining 10% of tests.

DLS Labs has integrated with Seventh Day Adventist clinics, allowing for the automated push of lab results fully into the EHR at Seventh Day Adventists clinics. DLS labs is also working with Guam Memorial Hospital (GMH) on a similar system (results into the EHR), and is working with GMH as GMH updates their lab systems and EHR (currently in progress).

The Guam HIE has reached out to both DLS and LabTech to strategize and provide connectivity options (such as NHIN Exchange and NHIN Direct) to both companies, and both companies have been receptive to integrating with the HIE and HIE infrastructure, including the pushing of lab results into the EHR for providers as providers adopt certified EHR technologies and systems. Both DLS and LabTech have stated a willingness to work with providers and provide lab results (pushed fully into the EHR), and are continuing to work with the Guam HIE on timelines and offerings, including for 2011 and for Meaningful Use. As DLS also acts as the Reference Lab for Commonwealth of the Northern Mariana Islands (CNMI), DLS has expressed an interest in NHIN Exchange to provide interoperable lab results to both CNMI and Guam (and both HIEs), as well as providers in both locations. The section of this document covering NHIN Direct contains additional information on the NHIN Direct offering for labs and providers, and lab interoperability.

The remaining five labs on Guam will continue to receive outreach and be updated on NHIN Direct and the Guam HIE, and how to allow for any results to be exchanged in an interoperable manner to providers, including into the EHR. Due to the current low-tech status and nature of these labs, outreach and specific strategies for each lab, based upon their technologies and sophistication will be provided by the HIE and HIE staff.

The Guam HIE will continue to work with all labs to drive results to and through provider EHRs, and will look to NHIN Direct as a connectivity methodology to achieve results in 2011 and beyond. The Guam HIE will continue to educate and provide outreach (both independently and via the REC) to all labs and continue to work on standardization of codes, systems, and formats (LOINC, etc).

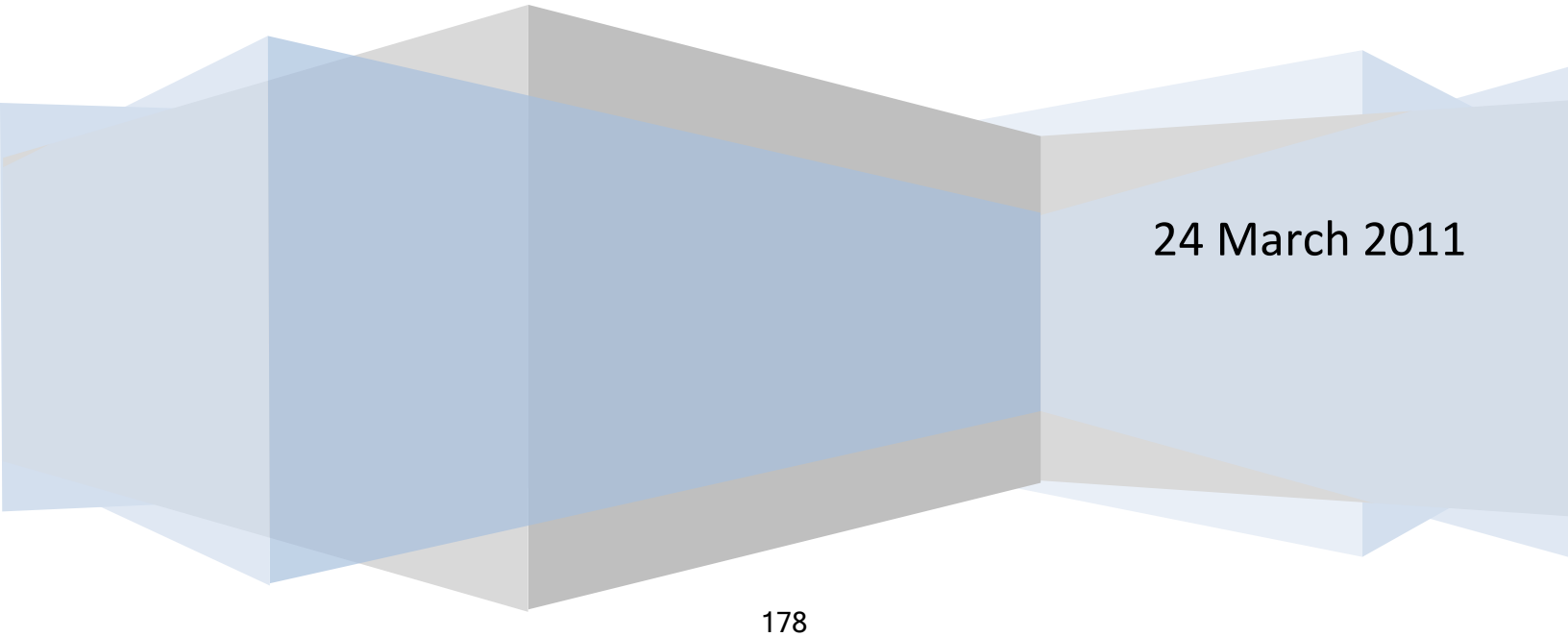
Specific strategies include:

- Strategy 1 - Work with the Regional Extension Center to develop a plan to provide assistance to labs in Guam who need help with integration with EHRs (as providers select and implement certified EHR systems). The Guam HIE will leverage existing information and work with the REC to create a list of certified EHRs for Guam with particular focus on the needs of lab interoperability.

- Strategy 2 – Work with the state legislature to identify laws and regulations to ensure alignment and compliance with CLIA regulations.
- Strategy 3 – Implement a standards-based architecture and core HIE services, including NHIN Direct, to assist providers in meeting Stage 1 Meaningful Use requirements as described above
- Strategy 4 – Work with Guam Medicaid to integrate standards-based interface language requirements in lab service contracts

Guam Health Information Exchange Addendum and Response to the ONC Letter Dated 3/17/2011

The Territory of Guam



24 March 2011

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Meaningful Use Attainment

- Please identify specific support activities to help the five labs currently unable to deliver structured lab results. **Response: The Guam HIE will continue to work with all laboratories on Guam to drive results to and through provider EHRs, and will look to NHIN Direct as a connectivity methodology to drive structured laboratory results to provider EHRs in 2011 and beyond. See section 1.1, page 5.**

- Although the Plan provides a good description of NW-HIN Direct implementation, it did not clearly articulate that it was an option for exchanges of clinical care summaries as part of Stage 1 Meaningful Use requirements, please clearly articulate that Direct will enable exchange of clinical care summaries in the plan. **Response: The Guam HIE will use the Direct messaging capability to support providers in sharing clinical care summaries across unaffiliated entities. Please review section 1.2 for details, page 9.**

Governance

- Please provide more clarification on the safeguards and privacy policies which need to be included to ensure privacy and security of patient health information, in compliance with the HHS Privacy and Security framework. **Response: The Guam eHealth Collaborative (GeHC) will require all providers, health plans, and other HIE users to sign the required HIE user privacy and security agreements designed under the HHS Privacy and Security framework. See section 2.1, page 10.**

- Please provide a better description of how the GeHC will execute the DURSA on behalf of all Guam providers, in order to participate in exchanges through the NHIN. **Response: The GeHC will execute the standard DURSA agreement or a modified version of that agreement on behalf of all participants in Guam. See section 2.2 page 11.**

- Please further describe the overall decision-making process of the governance body. **Response: Generally, the Board will follow the standard process of building consensus between stakeholders, operating with openness and transparency and using a majority decision making structure. See section 2.3 page 12.**

Financial

- Although the Operational Plan indicates that the amount of funds received will be sufficient, please provide specific details as to how GeHC will meet all Stage 1 MU requirements within these limits. **Response: With the use of NHIN Exchange and NHIN**

Direct, along with other technologies and services as outlined below, the Guam HIE will provide a complete HIE infrastructure in compliance with Stage 1 MU criteria in 2011. See section 3.1 page 13.

- Please further describe how GeHC can collaborate with other federally funded programs. For example, please describe how GeHC could leverage broadband grant funding and/or HRSA grant funding to increase adoption of EHRs to provide services needed for exchange. **Response: The Guam HIE will coordinate with HRSA and the Broadband Technology Opportunities Program, or BTOP. See section 3.2 page 16.**

Technical Infrastructure

- While the plan implies the ability of the Guam Direct service to enable EHR-to-EHR messaging, please provide more details as to how Guam's other participants would access Direct service, such as enabling a web portal or by some other mechanism. **Response: GeHC is planning to provide the Direct Client as a service on the Guam HIE Web Portal. Please refer to section 4.1 for details, page 18.**

- Please clarify how Guam plans to encourage its EHR vendors to support NW-HIN Direct service. **Response: An NHIN Direct Gateway is part of the overall Guam HIE technical infrastructure, and NHIN Direct is fully supported in the Guam HIE. See section 4.2, and specifically, strategy 3 page 19.**

- While Guam recognizes that other HISPs could participate in Guam's HIE market, the plan did not specify whether there would be a central certificate authority or more than one certificate authority. Additionally, please indicate how messages may flow between other HISPs. **Response: There will be a central certificate authority which will issue certificates to all licensed providers in Guam. Details on implementation of the Direct infrastructure and message flows are discussed in section 4.3 page 20.**

- It appears from the plan that servers will be deployed that will contain NW-HIN Connect software at the same time that Direct will be implemented but we also understand the Connect functionality will not be implemented until after Direct has been deployed. This seems like a prudent strategy but please confirm. Also, please clarify how Guam plans to implement the NW-HIN gateways, encourage provider participation and also describe requirements for participation. **Response: Yes, that is correct, the Guam HIE will not implement the NHIN CONNECT Gateway until after the Direct gateway and infrastructure has been deployed, and will focus all resources on Direct (and the Direct implementation in 2011) prior to deploying CONNECT use-cases/resources. Section 4.4 includes a strategy and plan for NHIN gateways along with a high-level timeline for NHIN gateway and Direct gateway implementation page 23.**

- The Plan discusses the use of standards based security mechanisms such as a Federated Identity Management service, PKI and RBAC. Please further describe any facilitated or directly offered services to be provided by the GeHC. **Response: GeHC will**

ensure that all services and systems facilitated and offered by GeHC will comply with privacy and security requirements for health information exchange and the Stage 1 Meaningful Use requirements. Details (including a list of services facilitated or offered by the GeHC) are discussed in section 4.5 and 4.6 page 27.

Project Schedule and Management Plan

- Guam's Plan includes a project timeline, identified milestones and deliverables. However, specific information is needed to better understand how Guam will be able to meet Stage 1 MU requirements within those timeframes. Response: All details and specifications on timeframes and solutions are detailed in section 3.1 page 13.

- In addition, please provide more information regarding communication strategies and program evaluation. Response: **The GeHC has already implemented an initial communications and education strategy and will use it to market the Guam HIE to stakeholders across the island and educate them on the value of health information exchange.** See section 5.1 page 30.

1. Meaningful Use Attainment

1.1. Laboratory Services and Structured Laboratory Results

The Guam HIE (GeHC) has been working in coordination with all laboratories and laboratory companies that provide services on and to the Territory of Guam, numbering seven (7) in total (plus the Naval Hospital). The Guam HIE has existing relationships with all seven laboratory facilities and companies, and has been meeting and planning on HIE roles, use-cases and participation for all seven laboratories. Special emphasis has been placed on the two major providers of laboratory services: DLS and LabTech. The Guam HIE continues to coordinate with these two major laboratory companies, as well as coordinating with the Guam Department of Health and Social Services (DPHSS), who operates clinics and laboratory facilities, as well as Public Health for Guam, for integrated laboratory results and reporting (including infectious disease reporting).

The Guam HIE has been working on multiple projects (and in coordination with DPHSS) with DLS and LabTech to provide the interoperable exchange (i.e. pushing/pulling) of lab results into the EHRs for providers on Guam as well as to public health (DPHSS) for HIV, infectious disease, and overall public health reporting. As such, the Guam HIE, in coordination with DPHSS, will continue to coordinate activities and resources with the two main laboratory companies: DLS (90% of market share) and LabTech (10% of market share), while working with each of the five remaining laboratories on specific education, outreach, and planning for any future ability to provide structured laboratory results. It should be noted, however, that many tests and diagnosis are outsourced to DLS in Hawaii or to a LabTech partner in Washington State.

Beyond DLS and LabTech, all five (5) remaining laboratory companies/providers on Guam are not capable, at this time, of providing advanced laboratory tests and diagnostic services (either on Guam or via another location), thus all are unable to provide or deliver structured laboratory results. A description of each of these laboratory facilities and capabilities is below, along with a detailed action plan for inclusion and participation/outreach in and with the Guam HIE and DPHSS:

Central Clinic

This facility is operated by the Guam Department of Public Health and Social Services (DPHSS) and houses the main public health laboratory. All blood samples are shipped to DLS in Hawaii for diagnostics and analysis as Central Clinic is not equipped to analyze blood-related tests and has a low set of infrastructure. Often patients requiring these tests are referred directly to a DLS satellite location for the blood draw process, rather than having the process performed onsite.

North Clinic

A regional DPHSS facility with very basic laboratory functionality that does not perform blood draws or analysis/diagnosis.

South Clinic

A regional DPHSS facility with very basic laboratory functionality that does not perform blood draws or analysis/diagnosis.

Strategy and Support for Central, North, and South Clinic: DLS in Hawaii is the provider of laboratory results for the Central Clinic, the North Clinic, and the South Clinic (each clinic outsources laboratory testing and analysis to DLS in Hawaii). The Guam HIE, in coordination with Guam DPHSS, is currently working with DLS on pushing laboratory results to DPHSS and the Guam HIE. The Central Clinic, North Clinic, and South Clinic are all starting the process in 2011 of implementing the RPMS EHR system for EHR needs, thus the Guam HIE, in coordination with Guam DPHSS, will work with DLS to ensure laboratory results are pushed into the Central Clinic, North Clinic, and South Clinic RPMS EHR using the same process that DLS is planning to employ for pushing results to DPHSS for public health reporting (DLS is planning a single, customized interface for the RPMS system/the public health system for DPHSS which would provide results to Guam DPHSS and all three clinics into the RPMS EHR). As DLS is currently working on this system to push laboratory results to DPHSS for public health reporting, adding the three clinics, all running a hosted version of the RPMS EHR, is on the roadmap for DLS and the Guam HIE (and DPHSS). The Guam HIE will continue to coordinate with DLS and Guam DPHSS, and will work to ensure all three clinics are supported with laboratory results from DLS, including offering NHIN Direct as a backup plan, should any unforeseen issues arise on the implementation of the customized interface that DLS and DPHSS are planning/working towards).

There are no plans currently for DPHSS, owner and operator of these three clinics, to upgrade onsite Laboratory Information Systems (LIS) for diagnosis and analysis of laboratory results locally, and as such, all results will come from DLS in the foreseeable future. Thus, having DLS results pushed back into the three clinic's RPMS is the extent of interoperable laboratory results exchange on the horizon. The Guam HIE, however, will continue to work with DPHSS and ensure education, outreach, and training are provided so that in the future, if any of the three DPHSS facilities upgrade laboratory infrastructure, there is a roadmap for integrated delivery of structured laboratory results.

Guam Memorial Hospital (GMH) Laboratory

A large hospital lab that outsources all blood-related testing and diagnosis to DLS in Hawaii.

Strategy and Support for Guam Memorial Hospital (GMH): GMH is working with DLS on integrating and having DLS (in Hawaii) push all lab results into the GMH EHR (this is an ongoing, current project). DPHSS, in coordination with the Guam HIE, is also working with GMH on a pilot program where HIV-related tests will be performed for all women in labor and delivery and then reported (pushed) to DPHSS for public health reporting, but this project is still in the planning phase and is not operational at this time. Discussions are currently ongoing that if GMH upgrades their laboratory information system to perform local analysis and diagnosis of laboratory tests, these results would be pushed to the Guam HIE, via NHIN Direct, for distribution via the Guam HIE Portal and NHIN Direct to providers willing and able to receive such results. However, this upgrade of GMH's laboratory information system would be a future phase and is unknown as to the timing and possibility of this upgrade occurring. The Guam HIE will continue to work with GMH and DLS to ensure that the current project to push structured laboratory results from DLS is successful. The Guam HIE will continue to coordinate with DLS and GMH for support of laboratory results from DLS, including offering NHIN Direct as a backup plan, should any unforeseen issues arise on the implementation currently underway.

Seventh Day Adventist (SDA) Laboratory

The SDA clinic system has a laboratory, is a major provider on Guam (visited by over 25% of patients on Guam) and has outsourced blood-related testing to DLS in Hawaii. Seventh Day Adventist currently has all of their DLS lab results pushed fully into the SDA EHR. If SDA upgrades their laboratory systems to provide local, onsite analysis and diagnosis of laboratory tests, these results would be pushed to the Guam HIE, via NHIN Direct, for distribution via the Guam HIE Portal and NHIN Direct to providers willing and able to receive such results.

Strategy for SDA: As SDA currently has outsourced services to DLS in Hawaii and currently has all DLS laboratory results pushed into the EHR, the Guam HIE will continue to work and educate SDA (including coordination with the REC and long-term strategy) on future capabilities for providing (pushing) structured laboratory results into the EHR, should SDA upgrade or acquire a new laboratory information system.

Naval Hospital Laboratory

The Naval Hospital and associated Naval Laboratory facilities have limited interaction with Guam DPHSS and the Guam HIE. It is believed that the Naval Hospital has full laboratory facilities, however, it is understood that all blood-related sexually transmitted disease (and related) tests are currently outsourced to a contractor in San Antonio, Texas. As such, it remains important to have the Naval Hospital integrated into the Guam HIE at a later date, via coordination with the DoD and VA VLER project and program, utilizing the Guam HIE NHIN Gateway, and perhaps (locally) NHIN Direct. The Guam HIE is pursuing participation of the DoD and VA in the Guam HIE, and participation in VLER, via NHIN.

Overall Guam HIE Strategy for Laboratory Support

There are seven laboratories on Guam, however most, if not all, blood-related and advanced tests are provided by, or outsourced to, two companies: DLS and LabTech. The remaining five laboratories on Guam have limited, to extremely limited, facilities/systems for providing lab tests and/or results (some are just screening or blood-drawing stations).

The Guam HIE has reached out to both DLS and LabTech to strategize and provide connectivity options (such as NHIN Exchange and NHIN Direct) to both companies, and both companies have been receptive to integrating with the HIE and HIE infrastructure, including the pushing of lab results into the EHR (for providers currently not having results delivered) as providers adopt certified EHR technologies and systems. Both DLS and LabTech have stated a willingness to work with providers and provide lab results (pushed fully into the EHR), and are continuing to work with the Guam HIE on timelines and offerings, including for 2011 and for Meaningful Use. As DLS also acts as the Reference Lab for Commonwealth of the Northern Mariana Islands (CNMI), DLS has expressed an interest in NHIN Exchange as well as NHIN Direct to provide interoperable lab results to both CNMI and Guam (and both HIEs), as well as providers in both locations. The section of this document covering NHIN Direct contains additional information on the NHIN Direct offering for labs and providers, and lab interoperability.

As DLS and LabTech are the major providers of laboratory results for Guam, the Guam HIE, in coordination with Guam DPHSS, will continue to work with the North, South, and Central Clinics, GMH, and SDA on pushing laboratory results into the EHR, including the DPHSS RPMS EHR

being implemented for the three DPHSS clinics. The Guam HIE will continue to work with the REC, coordinate meetings and outreach, and provide educational services with all seven (7) laboratory service providers on Guam, and, if any upgrades on localized laboratory technology occurs (specifically for the 5 laboratories with limited information systems as referenced above), the Guam HIE will coordinate and educate these key stakeholders on offerings and options including NHIN Direct and other technologies to ensure any and all laboratory results are pushed into provider EHRs on Guam. Thus, all laboratories on Guam will be provided with specific outreach, planning, and education on integration (including NHIN Direct, etc) from the Guam HIE, in coordination with DPHSS and the REC.

All laboratories on Guam continue to receive outreach and education/updates on NHIN Direct and the Guam HIE, and how to allow for structured laboratory results to be exchanged in an interoperable manner to providers, including into the EHR. Outreach and specific strategies for each lab, based upon their technologies, roadmap for technologies, and overall technical sophistication will be provided by the HIE and HIE staff (specific to each one of the five laboratories). The Guam HIE will continue to work with the REC and include these five laboratories in all planning, outreach, education, and strategy, to ensure that as providers adopt certified EHR technologies, all five laboratories have options (as well as are educated on the offerings and options for laboratory systems/upgrades/technologies) to participate and provide structured laboratory results.

The Guam HIE will continue to work with all labs to drive results to and through provider EHRs, and will look to NHIN Direct as a connectivity methodology to achieve results in 2011 and beyond. The Guam HIE will continue to educate and provide outreach (both independently and via the REC) to all labs and continue to work on standardization of codes, systems, and formats (LOINC, etc).

Specific strategies include:

- **Strategy 1:** Work with the Regional Extension Center to develop a plan to provide assistance to labs in Guam who need help with integration with EHRs (as providers select and implement certified EHR systems). The Guam HIE will leverage existing information and work with the REC to create a list of certified EHRs for Guam with particular focus on the needs of lab interoperability.

- **Strategy 2**: Work with the state legislature to identify laws and regulations to ensure alignment and compliance with CLIA regulations.

- **Strategy 3**: Implement a standards-based architecture and core HIE services, including NHIN Direct, to assist providers in meeting Stage 1 Meaningful Use requirements as described above

- **Strategy 4**: Work with Guam Medicaid to integrate standards-based interface language requirements in lab service contracts

1.2. Clinical Care Summary Exchange

The Guam HIE will fully support the option for exchanges of clinical care summaries as part of Stage 1 Meaningful Use requirements as defined in the Program Information Notice (PIN). Specifically, the Guam HIE will use Direct messaging capabilities to allow providers to share clinical care summaries across unaffiliated entities. The GeHC will provide this Clinical Data Exchange service using NHIN Infrastructure, including the CONNECT NHIN Gateway and Direct Gateway along with the NHIN Exchange Infrastructure detailed in Sections 4 and 5.

Specific strategies for Clinical Care Summary Exchange include:

- **Strategy 1:** The GeHC will serve as a HISP for individual providers and unaffiliated providers who want to use the GeHC Direct Gateway to support exchanges of clinical care summaries to meet Stage 1 Meaningful Use requirements.
- **Strategy 2**: The GeHC will coordinate with the REC to educate the REC and providers on Direct capabilities supporting clinical care summaries. The HIE will also continue to provide training, outreach and education to providers who are not working with the REC, to make sure no provider is left behind or missed in the outreach program on clinical care summaries.
- **Strategy 3**: The GeHC will work with the Regional Extension Center (REC) to develop a plan to assist to providers in Guam who need capability for exchange of clinical care summaries.
- **Strategy 4:** The GeHC will provide technical assistance to providers who want to exchange clinical care summaries via Direct.

In addition, the Guam HIE plans to choose the CCD standard for clinical data input and output and clinical data exchange. GeHC is aware of many providers who have EHR technology and are not capable of CCD compliancy. The costs can be prohibitive to implement full CCD compliance, especially for smaller providers and healthcare entities. Providers who are incapable of exporting and importing CCD documents from their EMR systems will either need to upgrade their EMR systems to allow for full CCD interoperability, or implement a custom translator service or interface for CCD compliance. As there is low adoption of EMR technologies on Guam, the HIE will coordinate with the REC to ensure that providers select certified EMRs that have appropriate CCD capabilities. Selecting such systems will limit the expense and impact of upgrading systems or building custom interfaces for standards-based clinical data exchange.

2. GeHC's Governance and Financial Strategy

2.1. Privacy and Security Safeguards

The Guam eHealth Collaborative (GeHC) will require all providers, health plans, and other HIE users to sign the required HIE user privacy and security agreement designed under the HHS Privacy and Security framework. In addition, the GeHC plans to adopt the "NHIN Access Consent Policies Specification" (or an appropriately modified NHIN Access Consent Policies Specification) and process for using the electronic consent form. The use of this form will apply to both intra-territory as well as intrastate transmission of ePHI/electronic health information. GeHC plans to use only one standard consent form.

Territory Laws

The GeHC's Privacy and Security Policy Committee will periodically review and update what is known regarding both the territory and federal policy framework for HIE and apply it to functioning and developing HIE activities. A broad range of perspectives are represented on this Policy and Committee including legal, technical, clinical and policy/advocacy.

Policies and Procedures

The GeHC's Board's Policy Committee supports the Board in adopting, communicating and overseeing effective organizational policies and procedures that support the mission and successful operations of the Guam HIE. This includes establishing policies and procedures related to privacy and security. The GeHC Board will adopt Governing Principles that guide the Privacy and Security Policy Committee's development of territory-wide privacy policies. The Governing Principles under consideration include:

1. Openness and Transparency: There should be a general policy of openness about developments, practices, and policies with respect to personal treatment data. Patients should be able to know what information exists about them, the purpose of its use, who can access and use it and where it resides.
2. Purpose Specification and Minimization: The purposes for which personal treatment data are linked should be limited to those treatment purposes or others that are specified on each occasion of change of purpose. This practice will minimize the potential privacy violations.
3. Information Limitation: Personal health information should only be linked for specified purposes, should be obtained by lawful and fair means and, where possible, with the knowledge or consent of the data subject.
4. Use Limitation: Personal treatment data should not be disclosed, made available, or otherwise used for purposes other than those specified.
5. Patient Participation: Patients should control access to their personal information:
    - Patients should be able to obtain from each entity that controls personal health data, information about whether or not the entity has data relating to them;
    - Patients' access to their information is through their home institution; and
    - No rights or responsibilities are overridden by GeHC.

6. Security Safeguards and Controls: Personal treatment data should be protected by reasonable security safeguards against such risks as loss or unauthorized access, destruction, use, modification, or disclosure.
7. Remedies: Remedies must exist to address any security breaches or privacy violations in compliance with federal, state and local laws and regulations as well as GeHC Policies. Policies will include:
    - Appropriate Use and Disclosure: The purpose of this policy is to ensure that Protected Health Information (PHI) contained in and used through the GeHC system is used and disclosed in a manner consistent with all applicable federal, state and local rules, regulations, and laws so that patient information is protected appropriately.
    - Patient Identification: The purpose of this policy is to establish the minimum data necessary for matching patient records, and to minimize, to the extent possible, incidental disclosures of protected health information.
    - Privacy Practices, Patient Participation and Control of Information in the MPI: The purpose of this policy is to declare Participant privacy practices, standards for patient participation and control of information in the Master Patient Index (MPI).
    - Security Protocols: The purpose of this policy is to ensure that data received, contained, and transmitted by Guam HIE is managed in a secure manner.

Oversight of Information Exchange and Enforcement

GeHC policies will be designed to state that any participant who misuses the Guam HIE system and/or information gathered through the Guam HIE system will be removed from the system and not allowed to use the system again. GeHC will establish audit functions and processes to assure that there is a mechanism monitoring potential misuse of the system within the Guam HIE. In order to support appropriate use, GeHC will require all users to participate in a training process that includes mechanisms to assure that users understand the expectations for system use. It is expected that these policies will continue to be refined as the territory-wide HIE learns from its experiences.

2.2. Execution of the DURSA

The GeHC will execute the standard DURSA agreement or a modified version of that agreement on behalf of all participants in Guam. The GeHC will also create a "step down" agreement under which all providers and users on Guam will be required to agree to all HIPAA privacy and security requirements, and, as applicable, all Medicare and Medicaid privacy and security requirements, 42 C.F.R. part 2 requirements, and other applicable territory and federal laws and other core requirements of the DURSA agreement. All participants will be required to execute this agreement before joining the Guam HIE. In addition, the GeHC will monitor adherence to the DURSA agreement and GeHC policies will be designed to state that any participant who misuses the Guam HIE system and/or information gathered through the Guam HIE system will be removed from the system and not allowed to use the system. GeHC will establish audit functions and processes to assure there is a mechanism monitoring potential violations of the DURSA agreement within the Guam HIE. In order to support appropriate use, GeHC will require all users to participate in a training process that includes mechanisms to assure that users understand the expectations for system use.

2.3. Decision Making Process of the Governance Body

The GeHCs Executive Order 2009-12 provides the initial structure for the Guam e-Health Collaborative. The statute provides for initial start-up of operations and ongoing management of GeHC. The Board consists of fifteen members who represent various healthcare stakeholders and include:

- Department of Public Health and Social Services
- Guam Memorial Hospital Authority
- Department of Mental Health and Substance Abuse
- Bureau of Information Technology
- Guam Retirement Fund
- Guam Medical Association/Society
- Guam Nursing Association
- Guam Pharmacists Association
- Guam Legislature
- Department of Administration
- Bureau of Budget and Management Research
- Health Insurance Company
- Chamber of Commerce
- Representative(s) identified by Collaborative

GeHC's roles and responsibilities include:

- Writing a comprehensive requirements document for building and operating the Guam Health Information Exchange (HIE)
- Operational control of the Guam HIE including the appointment of an Executive Director to handle the day-to-day operations
- Establishing committees to assist the Board in performing critical functions and recommending basic policy and operational structures and procedures as well as the appropriate legal agreements to ensure the HIE is compliant with all territory and federal laws
- Control of all revenue and expenditures
- Policy setting and adherence to territory personal practices
- Compliance with Health Information Portability and Accountability Act (HIPAA)

The decision making process will be established by the Board when it convenes after approval by ONC for funding. Generally, the Board will follow the standard process of building consensus between stakeholders, operating with openness and transparency and using a majority decision making structure. The newly elected Governor has made it a priority to get the GeHC Board operating as soon as possible and has instituted several policies aimed at a more open and citizen-focused government. The Board of Directors will adhere to these guidelines and make decisions incorporating stakeholder input and feedback.

3. Financial

3.1. Delivering Guam HIE within allotted funding

The Guam HIE (GeHC) recognizes the critical nature of providing a complete HIE solution to the providers and stakeholders on Guam to enable meeting of all Stage 1 Meaningful Use requirements within the allotted funding from the ONC. With the use of NHIN Exchange and NHIN Direct, along with other technologies and services as outlined below, the Guam HIE will provide a complete HIE infrastructure in compliance with Stage 1 MU criteria in 2011. The Guam HIE recognizes the importance of the use-cases as outlined in the Program Information Notice (PIN), and has focused on these primary use cases first, followed by other use-cases, including Guam-specific use-cases.

All strategies will be executed with the funds described in the Operational Plan. Specific strategies include:

- **Strategy 1:** In the second quarter of 2011, the GeHC will develop provider outreach and education programs, in coordination with the REC, DPHSS, and other key stakeholders to assist providers to meet all Stage 1 Meaningful Use requirements.
- **Strategy 2:** Starting in the second quarter (to third quarter) of 2011, the GeHC will build an NHIN Exchange and NHIN Direct infrastructure (beginning with the NHIN Direct infrastructure, along with privacy and security components ensuring compliance with the Privacy and Security Framework and HIPAA) to support NHIN Exchange and NHIN Direct exchange capability.
    - Full support and implementation of a CONNECT compliant NHIN Gateway, including support for bi-directional clinical data exchange.
    - Full support and implementation of Edge Servers for Record Locator Services and CCD clinical data exchange. These will be installed at stakeholders such as Guam Memorial Hospital, Public Health, Medicaid, and key Payers, as an example.
- **Strategy 3:** Starting in the second quarter and progressing through to completion in 2011, the Guam HIE (GeHC) will build and deploy a core HIE infrastructure to support Stage 1 MU. This Guam HIE infrastructure will provide the following services to providers to enable meeting all Stage 1 MU requirements, within the allocated funding limits provided by ONC:
    - Full support and implementation of NHIN Direct, enabling connectivity and interoperability with Pharmacies, structured laboratory results pushed into the provider EHR, and clinical data exchange.
    - Full support and implementation of GRID infrastructure with integrated Enterprise Master Patient Index, Patient Consent Management Modules (with opt-in and opt-out support), Provider Registry, Physician Portal, Messaging, Record Locator Service, PKI-based Federated Identity Management with Role-Based Access Controls, and ATNA audit logging subsystem.
    - Full support and integration with Strategy 2 as listed above, including the NHIN Gateway and EDGE Servers

The following table contains a list of Stage 1 Meaningful Use requirements and GeHC's strategy to meet the requirements in 2011 with allotted funding:

MU Provisions with Exchange Components

Criteria	Provider or HIE	GeHC's Strategy for 2011
Core Provision		
CPOE	Provider	Part of GeHC MU provider outreach and education
Adverse event clinical decision support (drug-drug/drug-allergy check)	Provider	Part of GeHC MU provider outreach and education
E-prescribing	HIE or Provider	GeHC encourages provider adoption; coordination with the REC on outreach and training/education
Record demographics	Provider	Part of GeHC MU provider outreach and education
Maintain up-to-date problem list of current and active diagnoses	Provider	Part of GeHC MU provider outreach and education; Access to clinical summaries is part of NHIN
Maintain active medication allergy list	Provider	Part of GeHC MU provider outreach and education
Maintain active medication list	Provider	Part of GeHC MU provider outreach and education
Record and chart changes in vital signs	Provider	Part of GeHC MU provider outreach and education
Record smoking status for patients 12 years old or older	Provider	Part of GeHC MU provider outreach and education
Implement one clinical decision support (CDS) rule along with the ability to track compliance with that rule	Provider	Part of GeHC MU provider outreach and education
Report ambulatory clinical quality measures electronically to CMS or the States	HIE	GeHC provides NHIN Exchange capability to meet this criteria: NHIN Exchange supports PQRI

Provide patients a copy of their electronic health information	HIE or Provider	Part of GeHC MU provider outreach and education, GeHC will provide NHIN Exchange capability if patient uses PHR service provider to maintain data
Provide electronic copy of discharge instructions at discharge	Provider	Part of GeHC MU provider outreach and education
Provide clinical summaries for each office visit	Provider	Part of GeHC MU provider outreach and education
Patient education	Provider	Part of GeHC MU provider outreach and education
Capability to exchange key clinical information (coordination)	HIE	GeHC provides NHIN Exchange and Direct capability to support this criteria, coordination with the REC to provide education, training, and outreach
Conduct security review analysis & correct deficiencies to protect electronic health information created or maintained by the certified EHR technology	HIE	GeHC's governance and technical strategy complies with Privacy and Security Framework and HIPAA
Menu Provision		
Implement Drug-formulary checks	Provider	Part of GeHC MU provider outreach and education
Record existence of advance directives	Provider	Part of GeHC MU provider outreach and education
Incorporate lab results as structured data	Provider	Part of GeHC MU provider outreach and education; GeHC will work with REC and providers to encourage adoption of standards (HL7); Direct capability to support pushing of structured laboratory results into provider EHR
Generate patient lists for specific conditions	Provider	Part of GeHC MU provider outreach and education
Send reminders to patients for preventive/follow up care	Provider	Part of GeHC MU provider outreach and education
Provide timely electronic access/ clinical summaries for each visit	HIE or Provider	Part of GeHC MU provider outreach and education; GeHC will provide NHIN Exchange capability if patient uses PHR service provider to maintain data

Perform medication reconciliation when a patient is received from another setting or provider	Provider	Complete set of data for reconciliation may require exchange to receive medication history from other providers
Provide summary of care for each transition of care and referral	HIE or Provider	Part of GeHC MU provider outreach and education; GeHC serves as HISP and provides Direct capability to support exchange of clinical care summaries
Submit electronic data to immunization registries or IIS	HIE	GeHC serves as HISP and provides Direct capability to support this criteria
Submit reportable lab results to public health agencies	HIE	GeHC provides NHIN Exchange and Direct capability to support this criteria
Submit electronic syndromic surveillance data to public health agencies	HIE	GeHC provides NHIN Exchange and Direct capability to support this criteria

The Guam HIE is committed to providing an HIE infrastructure and use-cases to assist all providers on Guam meeting Stage 1 Meaningful Use criteria in 2011.

3.2. Coordination with Federally Funded Programs

HRSA

The Health Resources and Services Administration (HRSA) is the primary federal agency for improving access to healthcare services for low income and uninsured individuals. The role of the Guam HIE will be to work directly with HRSA to obtain additional funding to expand resources and services available to low income and uninsured individuals. As Guam has a relatively high percentage of low income citizens and uninsured individuals, securing funding from HRSA will be a priority for the Board of Directors. In recognition of the need to secure additional funding from HRSA and other federal programs, GeHC will employ a full time grant writer to assist in writing and securing additional grants funds for the Guam HIE.

In addition, the GeHC, in coordination with the Regional Extension Center, will pursue HRSA funding to accelerate provider adoption of EHR technology in Guam. The intention for securing these grant funds will be to augment REC services in Guam and increase the presence of support personnel on the island. Many providers in Guam will require direct, hands-on interaction with qualified REC staff to help them with the transition to certified electronic technology. The GeHC will work diligently to secure these funds and provide the additional assistance needed.

Broadband

Guam is reasonably well connected and continues to expand its broadband connectivity. Guam

residents have experienced natural disasters – such as flooding and cyclones – and as such, have already installed some redundant systems. GeHC is aware of the Broadband Technology Opportunities Program (BTOP) and intends to apply for funding to extend broadband capability across the island. As descried above, GeHC will hire a grants person to pursue BTOP grants as well as HRSA grants. In addition, the current leadership for GeHC is being coordinated by Mr. Ed Cruz who is also the CIO for the territory and a member of the Governor's staff. In his role as CIO, Mr. Cruz has a direct interest in securing BTOP grants to ensure better broadband connectivity for all citizens on the island.

The first step in improving broadband connectivity will be to develop a Broadband Data and Development Program to identify areas where improvements are needed. The goal of the plan will be to secure funding to connect all hospitals, long term care facilities, and the affiliated clinics in the territory along with all public safety entities and others as identified through the planning process as needing improved access and speed.

4. Technical Infrastructure

4.1. Implementation/Operation of Guam HIE Direct Services

High Level Technical Implementation/Operation Strategy

The GeHC will create a guideline for the Guam HISP and 3rd party HISPs in Guam. This ensures that Direct implementations will follow Direct guidelines and specification as follows: Implementations should support S/MIME and certificate validation, and should support DNS and full message wrapping. Implementations that do not support DNS must have an alternate method for discovering recipient certificates (non-normative examples of this include LDAP-based provider directories, sending empty signed messages to transfer certificates and out-of-band transfer of certificates.)

The GeHC will provide Direct Services via the Guam HIE Web Portal. Initially, Direct Services will include laboratory reporting and clinical summary document exchange, including provider-to-provider referral. After the first phase of Direct-based messaging implementation, the GeHC will review other use-cases to add more services leveraging Direct Infrastructure for future phases.

High Level Guam HISP Implementation Plan (Phased Approach)

Phase 1

1. Survey and assessment of unaffiliated providers who want to use Direct for some Stage 1 MU requirements
2. Development of outreach and education program for participating providers
3. Development of the Guam HIE Direct Gateway
    - Development of Direct Infrastructure
        - Direct Gateway
        - Direct Client (Web Application)
        - Certificate Authority (CA) System
        - Provider Directory
    - Integration with NHIN Exchange Gateway
    - Integration with Guam HIE Web Portal (Web-based Direct Client)
4. Launching pilot projects with initial participating providers
    - Receipt of structured Lab Results
    - Sharing patient care summaries
5. Assessment of outcomes of pilot projects and Review of potential additional Direct services
6. Planning for HIE-wide roll out and development of additional Direct services

Phase 2

1. Outreach to underserved providers to encourage to participate in the Guam HIE through Direct
2. HIE-wide roll out
3. Assessment of new use cases to support Direct. Potential use-cases as include:
    - Sharing of clinical documents

- Sending a referral (consultation) and receiving a report back
- Supporting health information with personal health record (PHR) systems
- Public Health Laboratory reporting (for example, immunization report, reportable lab results, and syndromic surveillance data reporting)

4. Implementation of use-cases selected
5. Assessment of outcomes of new use-cases

4.2. The Direct Project and Guam Health Information Exchange

One of the key benefits of leveraging the Direct Project is that "it simplifies the number of agreements for participants so that it can extend the reach to include those who could not otherwise participate in health information exchange." Figure 1 in section 4.3 (page 22) shows a Direct-based abstract communication model for the Guam HIE. An NHIN Direct Gateway is part of the overall Guam HIE technical infrastructure, and NHIN Direct is fully supported in the Guam HIE. The NHIN Direct gateway will be implemented in 2011 with the highest priority (and prior to go-live of the NHIN CONNECT gateway or any CONNECT related use-cases, to enable immediate support of Direct and the ability for all providers on Guam to achieve Meaningful Use in 2011), allowing for any provider to easily and openly connect to the Guam HIE and to each other in 2011. It should be noted that the Guam government acts as a Health Information Service Provider (HISP)[14] for some providers, hospitals, and laboratories in Guam. Some providers, hospitals, and laboratories may also be affiliated with a 3rd party HISP for Direct Project services. Specific strategies include:

- **Strategy 1:** The Guam HIE does not intend to replace any existing health information exchange capabilities with the Direct Project. Instead, the Guam HIE will provide Direct-based services (acting as an HIE-governed HISP) as an option for individual providers (primary care physicians, specialists etc), larger providers (unaffiliated hospitals, clinics, etc), and laboratories. Special attention will be paid to small-office providers, small regional providers and clinics who cannot afford or are not currently planning to support Stage 1 Meaningful Use HIE requirements in 2011.
- **Strategy 2:** The Guam HIE will fully support Direct, and will provide Direct as a connectivity methodology in 2011 for any provider who chooses to connect to the Guam HIE utilizing Direct.
- **Strategy 3:** The Guam HIE will coordinate with EHR vendors to support Direct-based data exchange capability in their future product releases. Due to the long lifecycle of EHR solution upgrades (adding new features and modules and integrating new capabilities into existing EHR solutions), Guam will encourage EHR vendors to start planning and development in 2011. The goal will be to release Direct Messaging-capable EHR versions starting in 2012 at latest. In the meantime, Guam will work with providers to use GeHC 's Direct service or a 3rd party HISP Direct service until a new version of their EHR systems is released.

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[14] An entity that is responsible for delivering health information as messages between senders and receivers using the Direct project technology over the Internet

- **Strategy 4:** The Guam HIE will provide coordination with the Regional Extension Center (REC) to drive education and outreach on NHIN Direct. This will ensure the REC and providers are fully aware of the potential of Direct, and will ensure that Direct is a fully-supported HIE connectivity methodology in 2011. The HIE staff and team will focus on supporting the REC to make sure the REC can support each and every provider on NHIN Direct. This outreach and coordination with the REC by the HIE team and staff will be ongoing, beginning in 2011. The Guam HIE will also continue to provide training and outreach to providers who are not working with the REC, to make sure no provider is left behind or missed in the educational program on Direct.
- **Strategy 5:** Guam HIE will target three main use-cases with Direct capability:
    1. A provider with no EMR/EHR: These providers can utilize Direct to connect to the Guam HIE, including messaging, in 2011.
    2. A provider with an EMR/EHR communicating with a provider with no EMR/EHR: Both providers can utilize Direct as a messaging platform, allowing for the exchange and sharing of data.
    3. Two providers with EMRs/EHRs: These providers can utilize Direct for secure messaging from system to system.

- **Strategy 6:** In order to support Direct, the Guam HIE will develop a provider directory which will contain end-provider information such as endpoints and digital certificates. Both Direct and NHIN Exchange leverage Public Key Infrastructure (PKI) technology, which requires a Certificate Authority (CA) to issue digital certificates for providers. To support health information exchange with neighboring state and territory HIEs and federal agencies, the Guam HISP will include modules for conversion (transport, trust, and data content) between NHIN Exchange and Direct.

4.3. Guam HIE Direct Implementation – Strategy and Operation

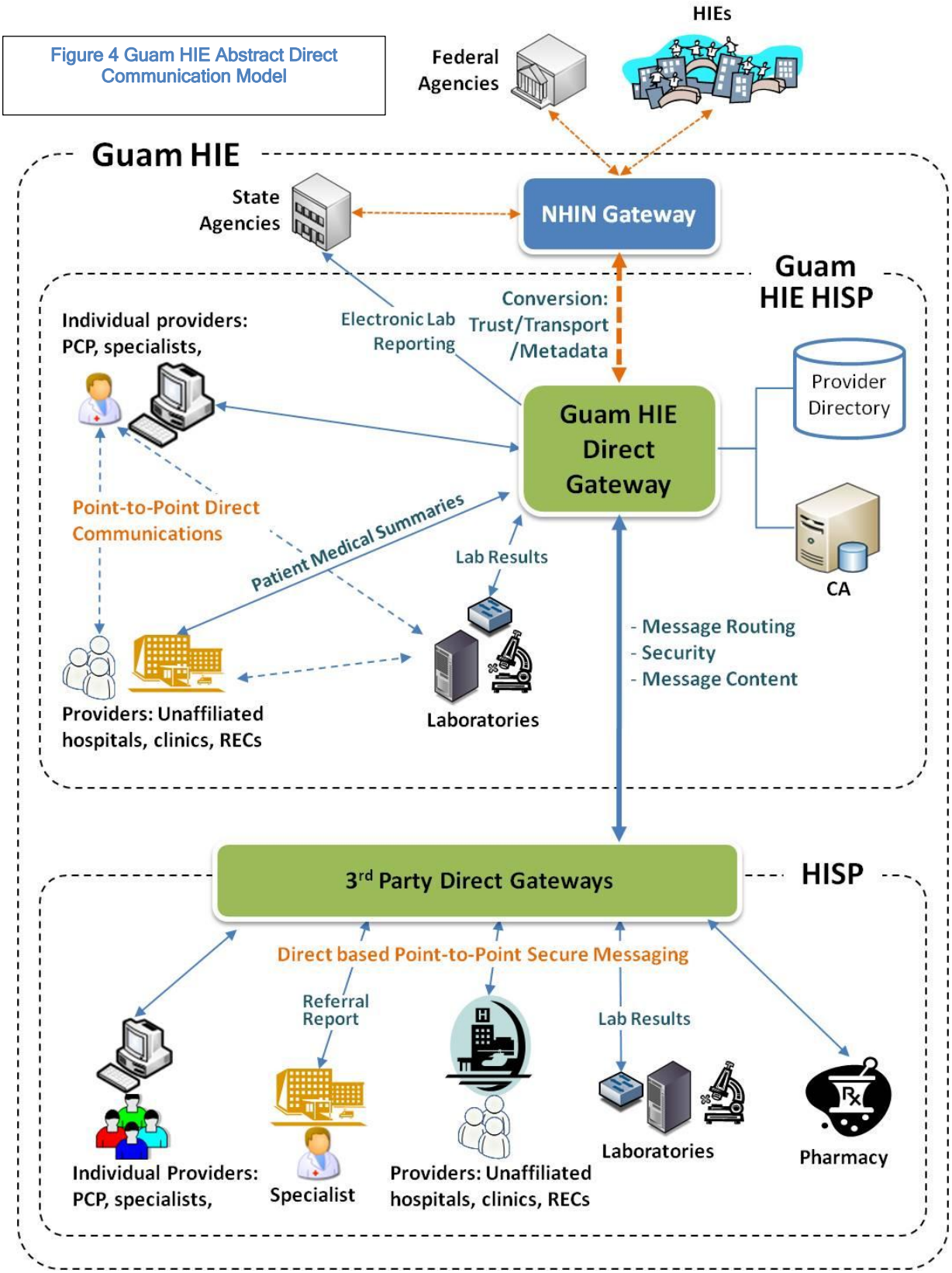
The GeHC will adopt Direct-based messaging to provide health information exchange capability to unaffiliated healthcare organizations. The GeHC, in support of its role as a HISP, will provide unaffiliated organizations and individual providers with laboratory reporting capability and exchange of clinical summary documents through Direct. The following includes GeHC's strategy for development, deployment, and operation of the Direct Infrastructure. Other organizations in Guam may choose another 3rd party HISP for their affiliation.

Direct Gateway

Guam will implement a Direct Gateway for providers who want to use the Guam HIE Direct HISP for direct capability. The Guam HIE Direct Gateway will provide a core infrastructure for push-based messaging, PKI-based security and data conversion. Key components will include an SMTP server, SMTP gateway, Security Agent and an XDD gateway which will enable communication between IHE/NHIN Exchange nodes and the Direct Project SMTP backbone.

The Guam HIE will ensure that the Direct Gateway complies with all the Direct Project guidelines and specifications for interoperability.

Figure 4 Guam HIE Abstract Direct Communication Model



Other Infrastructure

Certificate Authority (CA)

The GeHC will implement a Guam-based central CA server and generate a root certificate to issue certificates to all participating organizations, individuals, and systems. Initially, a CA server will be implemented to support Direct-based exchange capability. However the GeHC will consider chaining the Guam CA to the Federal Bridge CA to support data exchange with Federal providers and agencies. During the implementation process, GeHC will ensure that the CA server follows all Direct requirements, including the requirements for HIPAA compliance, Identity Assurance Level 2 (NIST Special Publication 800-63) and all other requirements specified in the document "Direct: Applicability Statement for Secure Health Transport." This document is available at: http://wiki.directproject.org/Applicability+Statement+for+Secure+Health+Transport

The features of the CA to be supported include:

- Issuance of digital certificates.
- OCSP (Online Certificate Status Protocol) or CRL (Certificate Revocation List) for certification verification.
- Publication of public certificates to systems supporting universal digital certificate discovery, such as DNS servers or LDAP. The functionality of certificate discovery will be separated from the CA server as discussed in Direct project guidelines.

Certificate Discovery System (Provider Directory)

The Guam HIE will implement a unified provider directory to support discovery of all licensed providers in Guam. The provider directory should contain provider information including, but not limited to, provider type, provider unique IDs (such as NPI), specialties, credentials, demographics and sever locations. Additionally, in order to support Direct capability, the provider directory will also support the features "discovery of public certificate" and "discovery of provider Direct end-point address."

Other features of the provider directory include:

- Provision of provider's information
- Provision of provider's health domain address (aka Direct Address): the addresses (endpoints) will be used for a provider to send Direct messages to another trusted provider.
- Provision of provider's public certificates

Direct Client

Direct Client is the client side of the Direct-based communication. Since Direct is based on SMTP with S/MIME, it is essentially an email client with additional functionalities. It should provide the following core functionalities:

1. Identifying the destination to which the Direct messages are to be sent
2. Receiving inbound messages from a HISP

3. Constructing an outbound message with one or more documents to a HISP.

A Direct Client can be a Web application. Such as a portal, or a desktop application. The GeHC is planning to provide the Direct Client as a service on the Guam HIE Web Portal.

Message Exchange between Guam HISP and other HISPs

For interoperable data exchange between the Guam HIE HISP and 3rd party HISPs, the GeHC will ensure that all other 3rd party Direct Gateways follow security, interoperability and policy guidelines specified by the Direct Project. All messages exchanged between the Guam HISP and other HISPs will follow Direct technical specifications. Specifically, all the messages sent by member providers will be encrypted and the sending HISP will be authenticated. The Sender HISP will query the Guam HIE Provider Directory service to retrieve the recipient provider's certificate. Upon establishment of a mutual trust relationship between the Sender HISP and the Recipient HISP, messages will be transmitted to the Recipient HISP. The Recipient HISP will decrypt the message and deliver it to the intended recipient.

In order to support an Inter-HIE data exchange capability, GeHC will implement a standard CONNECT Gateway, as offered by the Office of the National Coordinator. This standard gateway is detailed at the site www.connectopensource.org.

4.4. High-Level Strategy for NHIN; NHIN Gateway Implementation

In order to support an Inter-HIE data exchange capability, GeHC will implement a standard CONNECT Gateway, after operationalizing the Direct offering, as offered by the Office of the National Coordinator. This standard gateway is detailed at the site www.connectopensource.org.

The Guam HIE clearly understands the critical nature of implementing and operationalizing Direct as quickly as possible in 2011, to allow all providers on Guam the ability to achieve Stage 1 Meaningful Use. All priorities and resources in regards to NHIN will be focused on getting Direct implemented and running in 2011. To be clear, NHIN CONNECT will take a back-seat in the project until after Direct has been implemented and is operational.

However, due to the work being done between the CDC and Guam Public Health, and the potential for CDC to fund a project with Guam Public Health using NHIN CONNECT; the interest the VA and Department of Defense have had in Guam (due to the large military presence on Guam) and connecting the Guam VLER project to the DoD using NHIN CONNECT; and that Diagnostic Laboratory Systems in Hawaii (the reference lab for CNMI, Guam, and other Territories) has expressed an interest in using NHIN CONNECT as a sophisticated infrastructure to connect to all the Territory HIEs as a reference lab, we believe it is important to have an overall NHIN CONNECT strategy for future HIE to HIE use-cases and Federal Agency to Guam HIE use cases, as listed above.
It should be noted, however, that Direct, and the ability to enable Stage 1 Meaningful Use for all providers on Guam via Direct in 2011 takes all priority. Even though the plan shows an NHIN CONNECT Gateway installation in 2011, we recognize that the process of the above NHIN CONNECT use-cases, CONNECT workflow, and overall NHIN CONNECT on-boarding (DURSA) will take significant time and

negotiation, and probably will not be functional until after 2011 (2012, etc). All resources will focus on Direct as a core component of the Guam HIE in 2011. Again, the focus of the plan (and 2011) is allowing Stage 1 Meaningful Use achievement by all providers on Guam, and Direct is an immediate, core component that will be implemented as quickly as possible after Strategic and Operational Plan approval by the ONC.

As CONNECT is the fully NHIN-tested and compliant offering from the ONC and United States Government, the Territory of Guam can ensure full compliance and interoperability with NHIN by using a NHIN Gateway based upon CONNECT standards. As the CONNECT NHIN software is updated quarterly by the ONC and the CONNECT Team, the GeHC may implement an NHIN Gateway as a managed service from a CONNECT certified vendor (with full quarterly upgrades and compliancy insured). Alternatively the GeHC could budget and staff internally for the GeHC to ensure the NHIN Gateway is upgraded, patched, and supported quarterly to ensure full compliance and interoperability with NHIN.

The CONNECT Software Development Kit (SDK) includes a set of interfaces and adapters. The GeHC trading partners will have a variety of HIE engines and services that will need to be integrated with the GeHC NHIN Gateway through proprietary adapters.

Key tasks required for NHIN Gateway development and maintenance include:

- Ongoing updates on NHIN Core Service Interface Specifications as new specifications are developed and become available
- Ongoing updates on NHIN Exchange Profiles
- Testing, installation, configuration, and upgrade of the CONNECT NHIN Gateway (CONNECT SDK) as a new version of CONNECT SDK is released quarterly
- Establishing new connectivity to federal agencies and/or other territory or statewide/regional HIEs

Specific strategies include:

- **Strategy 1:** The GeHC and its technical partner, MEDNET[15], will ensure the implementation of NHIN data exchange capability with the CONNECT SDK NHIN Gateway solution in multiple phases, as detailed below.
- **Strategy 2:** The GeHC will review the DURSA and develop a legal and business agreement for the Guam HIE participants. Every provider should sign the legal and business agreement in order to join the NHIN network via the Guam HIE and use NHIN services and Direct services.
- **Strategy 3:** The GeHC will design and implement a communications and education program to educate and encourage providers on the use of NHIN services and Direct services

[15] MEDNET is one of the official partners (technical vendors) of the CONNECT Gateway. MEDNET has provided CONNECT SDK-based NHIN Gateways for several customers and has worked with federal agencies including SSA and CMS.

Phase 1 (Beginning in 2011-After Successful Deployment of Direct): Building a NHIN Gateway Infrastructure

In this phase, the Guam HIE will build an NHIN Gateway infrastructure for NHIN Exchange capability to support health information exchange between other state HIEs, other US territories, and federal agencies. The NHIN Gateway infrastructure will be integrated with the Guam HIE backend engines (such as the provider directory, consent registry, eMPI, audit record repository and ESB engine) through adapters and providers' EMR systems, and the Guam HIE Direct gateway. Phase 1 steps include:

1. Review Initial NHIN Technical Infrastructure: The GeHC will review the initial NHIN technical infrastructure (system architecture and design) and finalize the system architecture and design.
2. Build system environments: The Guam HIE will stand up two system environments to host CONNECT NHIN Gateways for NHIN Exchange capability. These are the Development/Testing Environment and the Production Environment.
3. Deploy CONNECT NHIN Gateway: The Guam HIE will install the CONNECT NHIN Gateways on a Development/Testing Environment and a Production Environment respectively. Basic installation, self-testing and conformance testing will be conducted.
4. Review Legal and Business Agreement: The Guam HIE will review the DURSA agreement and ensure that legal and business agreements between Guam HIE trading partners are aligned with the DURSA.
5. Integrate CONNECT NHIN Gateway with HIE systems and participating providers' systems: The Guam HIE will integrate the CONNECT NHIN Gateway to the Guam HIE backend engines (such as the provider directory, consent registry, Guam HIE eMPI system, audit record repository, and ESB engine) through adapters and providers' EMR systems, and the Guam HIE Direct gateway. The integration will be conducted on the development/testing environment. Connectivity testing, interoperability testing, and end-to-end testing will be conducted.
6. ONC On-boarding: The Guam HIE will contact the ONC to plan NHIN Onboarding. The Guam HIE will follow ONC's onboarding guidance.
7. Stage test CONNECT NHIN Gateway to the production environment: After the Guam HIE completes ONC NHIN Onboarding, the Guam HIE will stage the CONNECT NHIN Gateway from the development/testing environment to the production environment.
8. Identify NHIN Trading Partners: The GeHC will identify trading partners (HIEs and federal agencies) which exchange health information over NHIN. The GeHC will use the CONNECT NHIN Gateway to connect to federal agencies on various projects. Potential projects include the list below, however, no trading partners listed below will be connected and integrated using CONNECT until after successful deployment in 2011 of the Direct infrastructure to enable Meaningful Use achievement in 2011:

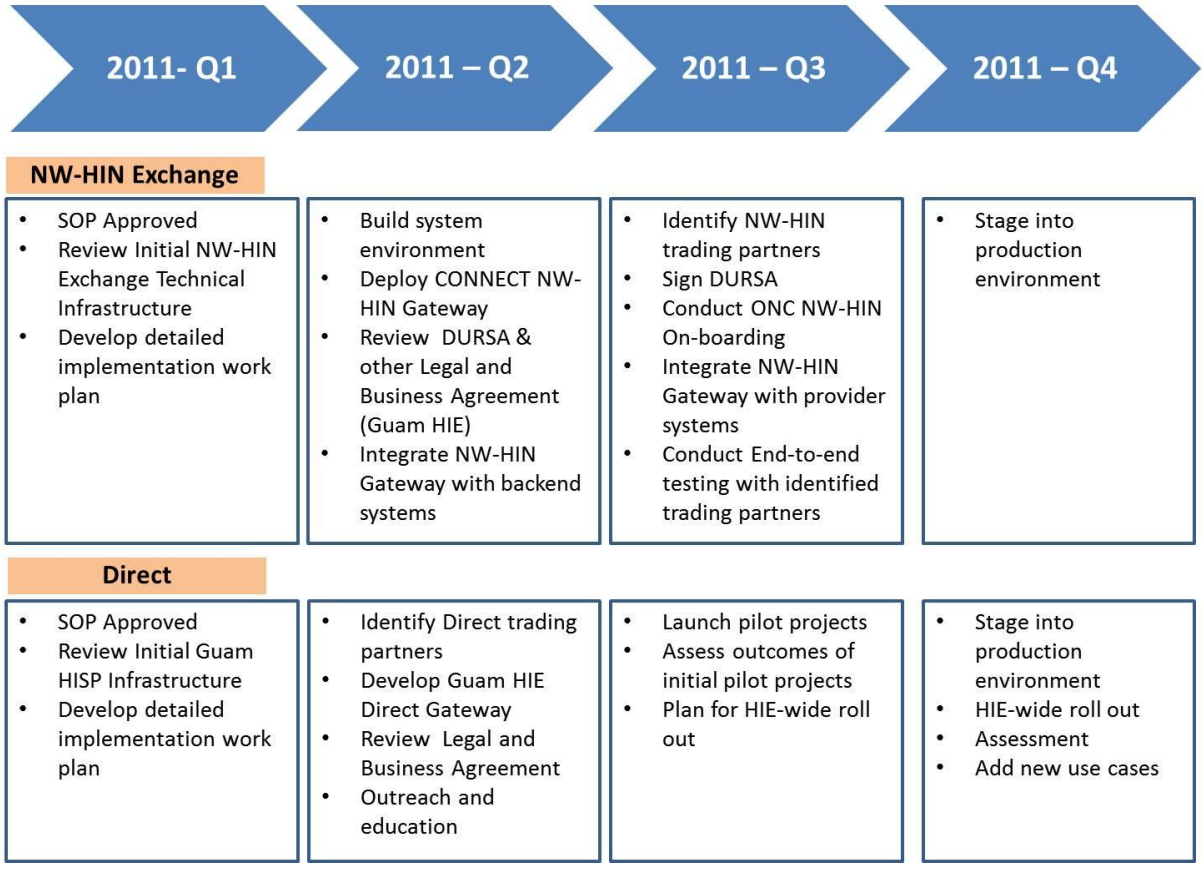
- SSA: Exchange of summary patient records for SSA Disability Determination Purposes
- VA/DoD: Exchange of Summary Patient Records for the Virtual Lifetime Electronic Record (VLER)
- CDC: Biosurveillance and Case Reporting
- CMS: CMS C-HIEP Project: Reporting de-identified quality assessment data to CMS
- CMS: Electronic Submission of Medical Documentation (esMD Project)

Phase 2 (2012 forward): Connecting to HIEs and Building Use-Cases

In this phase, the GeHC will choose initial HIE and Federal agency trading partners to support HIE-to-HIE business use-cases. After initial HIEs and federal agencies are chosen, GeHC will conduct the following process to implement the identified use-cases:

1. Review Business Use-Case and Identity Trading Partners
2. Identity Business Requirements and the Scope of the Project
3. Sign Legal and Business Agreement
4. Create a Project Work Plan
5. Design the System Architecture
6. Implement Business Use-Case
7. Conduct Tests
8. Move Production

Following diagram describes a high-level timeline for implementation of NHIN Exchange and Direct.


2011- Q1
2011 – Q2
2011 – Q3
2011 – Q4
NW-HIN Exchange
SOP Approved
Review Initial NW-HIN Exchange Technical Infrastructure
Develop detailed implementation work plan
Build system environment
Deploy CONNECT NW-HIN Gateway
Review DURSA & other Legal and Business Agreement (Guam HIE)
Integrate NW-HIN Gateway with backend systems
Identify NW-HIN trading partners
Sign DURSA
Conduct ONC NW-HIN On-boarding
Integrate NW-HIN Gateway with provider systems
Conduct End-to-end testing with identified trading partners
Stage into production environment
Direct
SOP Approved
Review Initial Guam HISP Infrastructure
Develop detailed implementation work plan
Identify Direct trading partners
Develop Guam HIE Direct Gateway
Review Legal and Business Agreement
Outreach and education
Launch pilot projects
Assess outcomes of initial pilot projects
Plan for HIE-wide roll out
Stage into production environment
HIE-wide roll out
Assessment
Add new use cases

4.5. Federal Requirements for Security and Privacy

The HHS secretary has adopted the following standards for health information technology to protect electronic health information that is created, maintained, and exchanged[16]:

(a) Encryption and decryption of electronic health information:

(1) General. Any encryption algorithm identified by the National Institute of Standards and Technology (NIST) as an approved security function in Annex A of the Federal Information Processing Standards (FIPS) Publication 140–2 as shown in the table below

Approved Security Functions	**Algorithms**
Symmetric Key	Advanced Encryption Standard (AES), Triple-DES Encryption Algorithm (TDEA) and Escrowed Encryption Standard (EES)
Asymmetric Key	Digital Signature Standard (DSS) – DSA, RSA and ECDSA
Secure Hash Standard	SHA-1, SHA-224, SHA-256, SHA-384 and SHA-512
Random Number Generation	Deterministic Random Number Generators listed in NIST FIPS 140-2 Annex C
Message Authentication	Triple-DES MAC, CMAC, CCM, GCM, GMAC and HMAC
Key Management	NIST Recommendation for Key Derivation Using Pseudorandom Functions, SP 800-108

(2) Exchange. Any encrypted and integrity protected link.

(b) Record actions related to electronic health information:

The date, time, patient identification, and user identification must be recorded when electronic health information is created, modified, accessed, or deleted; and an indication of which action(s) occurred and by whom must also be recorded.

(c) Verification that electronic health information has not been altered in transit.

[16] 45 CRF Part 170 – *Health Information Technology: Initial Set of Standards, Implementation Specifications, and Certification Criteria for Electronic Health Record Technology; Final Rule*

A hashing algorithm with a security strength equal to or greater than SHA–1 (Secure Hash Algorithm (SHA–1) as specified by the National Institute of Standards and Technology (NIST) in FIPS PUB 180–3 (October, 2008) must be used to verify that electronic health information has not been altered.

(d) Record treatment, payment, and health care operations disclosures.

The date, time, patient identification, user identification, and a description of the disclosure must be recorded for disclosures for treatment, payment, and health care operations, as these terms are defined at 45 Code of Federal Regulations (CFR) 164.501.

4.6. Guam HIE's Strategy

The Guam HIE deployment will fully comply with local, national and HHS Privacy and Security guidelines. Integrated into the Guam HIE are core security and privacy mechanisms and these elements will be present in all phases of the project from the beginning of the implementation. The Guam HIE's technical partner, MEDNET, is an industry leader in privacy and security technology, providing HIE solutions with Federated Identity Management (FIM), Role-Based Access Control (RBAC) and military grade PKI encryption technology allowing for single sign-on and user authentication. The wide range of security functions supported by the Guam HIE will include user authorization, authentication, non-repudiation, digital encryption, audit logs, opt-in/opt-out and administrative capabilities. Specific GeHC facilitated or offered services will include:

- **Federated Identity Management and Role-Based Access Controls (RBAC)**
  GeHC will facilitate a federated identity management service (along with RBAC capability) for the users of Guam HIE services. MEDNET Federated Identity Management (FIM) Service is an implementation of a Security Assertion Markup Language (SAML) enabled Security SOA (Service Oriented Architecture). This architecture enables exchange among a federation of trading partners in different security domains. Each healthcare facility or organization is associated with an Identity Provider (some Identity Providers might be shared by multiple facilities). The service supports key functions, including:
    1. Single Sign On (SSO)
    2. Authentication
    3. Authorization
    4. Role Based Access Control (RBAC)

- **Patient Consent Management**
  The GeHC will facilitate a patient consent management system as part of the Guam HIE. The MEDNET Patient Consent Management System (PCMS) is a robust, modular HIE offering with sophisticated opt-in/opt-out services and an integrated ATNA audit log. In order to comply with HIPAA privacy regulations, the MEDNET Patient Consent Management System (PCMS) operates using a complex set of rules to ensure that

patients who have opted out of the system do not have their records accessed via a Record Locator Service (RLS) or other systems.

- Audit Log Repository
  The GeHC will facilitate a standards-based Audit Log Repository to log all auditable events for future review.

5. Communication Strategies and Program Evaluation

5.1. Communication Strategy and Additional Information

Communication Strategy

The GeHC has already implemented an initial communications and education strategy and will use it to market the Guam HIE to stakeholders across the island and educate them on the value of health information exchange. Meetings with prospective stakeholders have been conducted and visits made to all the major and critical participants. The GeHC has a plan in place to identify the members of the Board and to become operational as soon as ONC funding is approved. One of the first orders of business will be to develop a broad and comprehensive communications and education plan.

The GeHC will ensure the communications and education plan includes the following activities:

- Create a Board committee to help with communications and education and have them report monthly on their activities
- Design and implement a comprehensive communication plan for education and outreach to providers in Guam
- Work with the Regional Extension Center and workforce development program to coordinate educational programs and activities for providers on Guam
- Design a program for regular communications with all providers on Guam using a variety of methods including:
    - e-mail
    - webinars
    - hosted meetings and education events
    - person-to-person meetings
    - printed materials
    - public service announcements
    - social media
    - others as appropriate
- Monitor success through provider adoption rates

Program Evaluation

The GeHC believes it is important to track and monitor project progress and compliance with Meaningful Use requirements. Therefore, as a part of its project design, evaluation criteria will be established, tracked and reported to the GeHC Board of directors. The program evaluation process will involve five key phases.

- Phase 1 – Determining Evaluation Criteria
  As a part of the implementation plan, the GeHC will establish key milestones and measurement criteria related to critical project activities. Examples of these criteria will include provider

adoption rates, access to NHIN Direct, usage rates for e-prescribing, secure clinical messaging, results reporting, etc.

- Phase 2 – Establishing Monitor Processes and Collecting Data and Information
  Once the criteria are established, the GeHC will assign responsibility, likely the Executive Director, for monitoring progress towards each measure. A process to collect data and information will also be established so the GeHC receives information in a timely manner.

- Phase 3 – Evaluating Data and Information
  As the data and information are collected, a process to evaluate the results will be established. Once established, analysis against the criteria will be conducted to determine if the project goals are on track.

- Phase 4 – Reporting Results
  A dashboard report will be produced to inform the GeHC of project progress and to identify any material issues. The GeHC will receive regular reports at monthly meetings and will have a standing agenda item to address any issues that arise.

- Phase 5 – Corrective action
  Once an issue is identified, corrective action will be determined and the GeHC staff assigned responsibility to ensure each issue is resolved and corrective action taken.

Business Associate Agreements

A business associate agreement is the contractual form used to detail the terms and conditions of a health care organization that wishes to participate in health information exchange. The business associate agreements (BAAs) clearly define the use and disclosure of health information in accordance with state privacy laws and the Health Insurance Portability and Accountability Act (HIPAA) Security and Privacy Rules. The GeHC will model its BAA's after national models already written and available through a variety of resources such as the National Governors Association (NGA). All participants will be required to sign an agreement as a condition of participation in the Guam HIE. The GeHC will develop appropriate procedures to audit and maintain compliance with the agreements over time as well as fit the legal structure of Guam.